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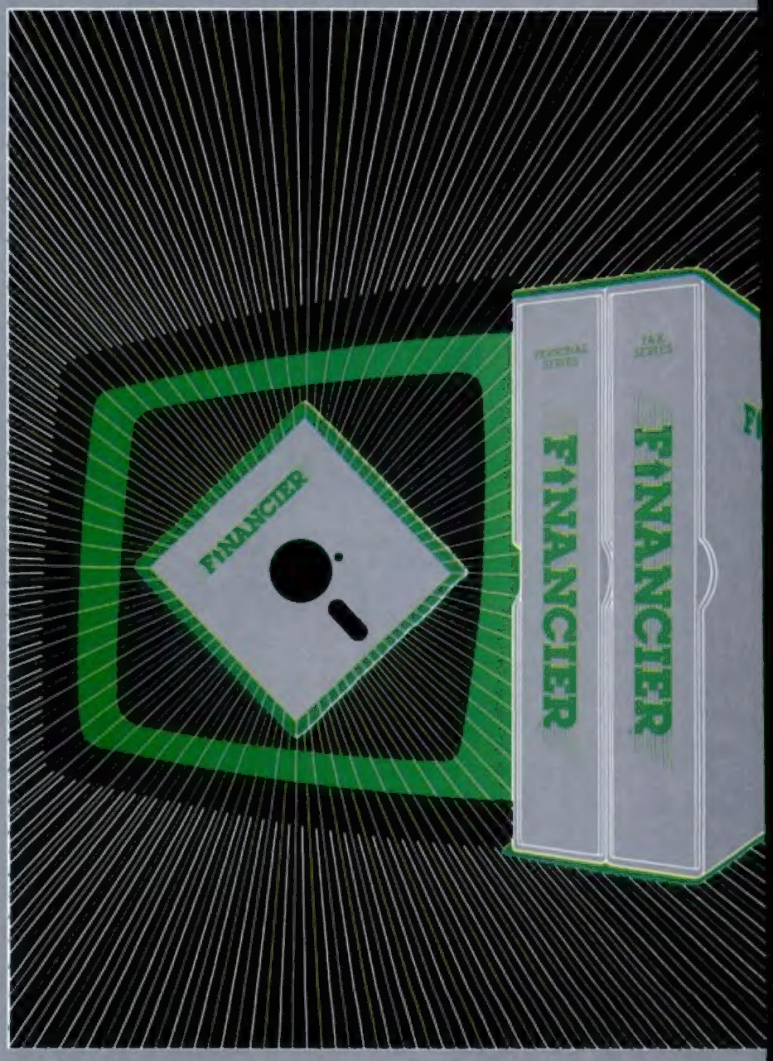
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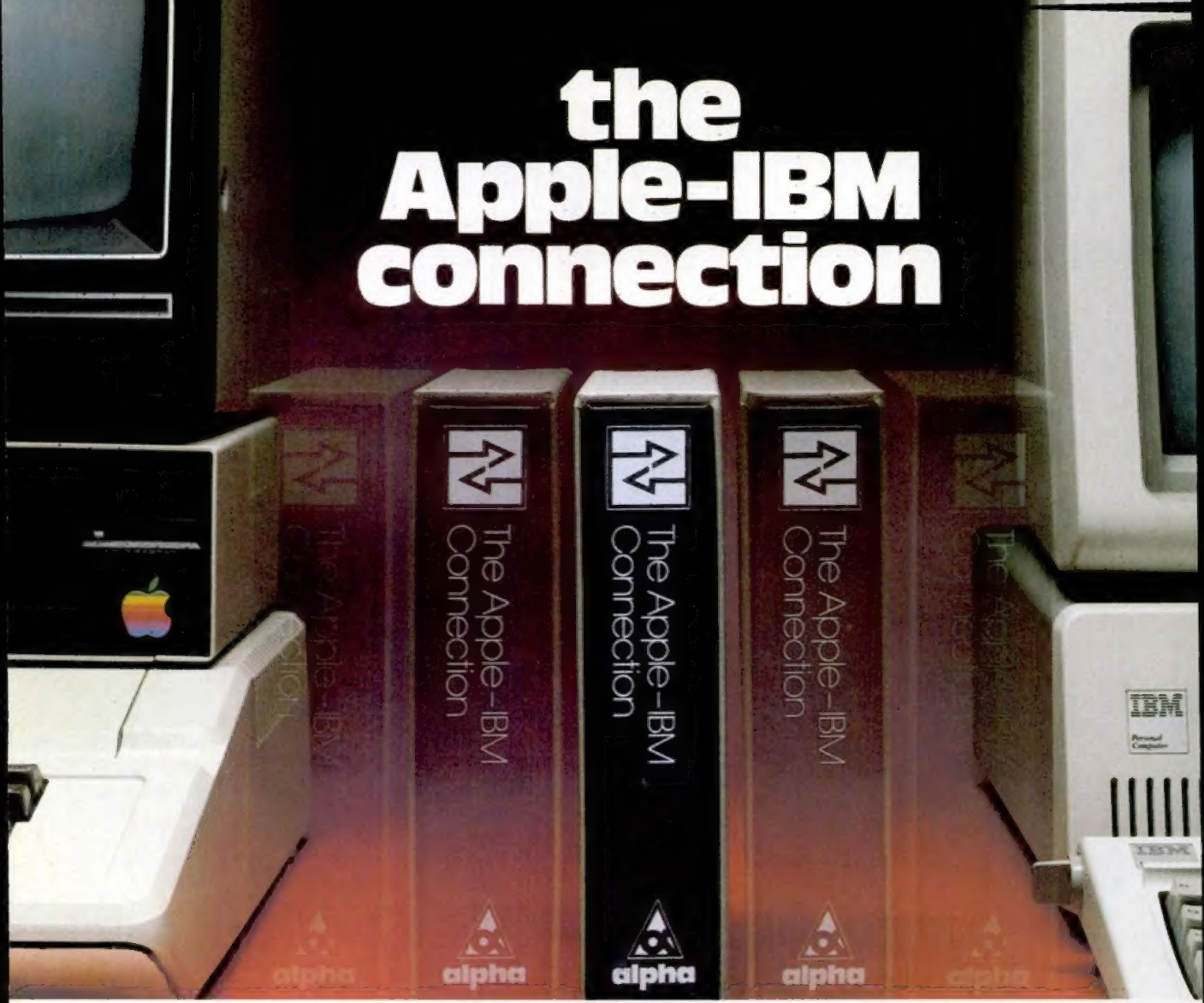
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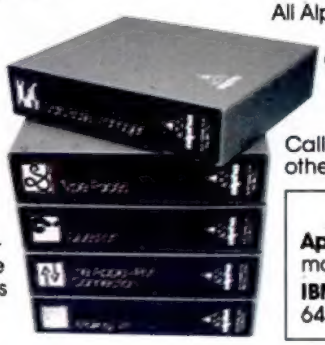
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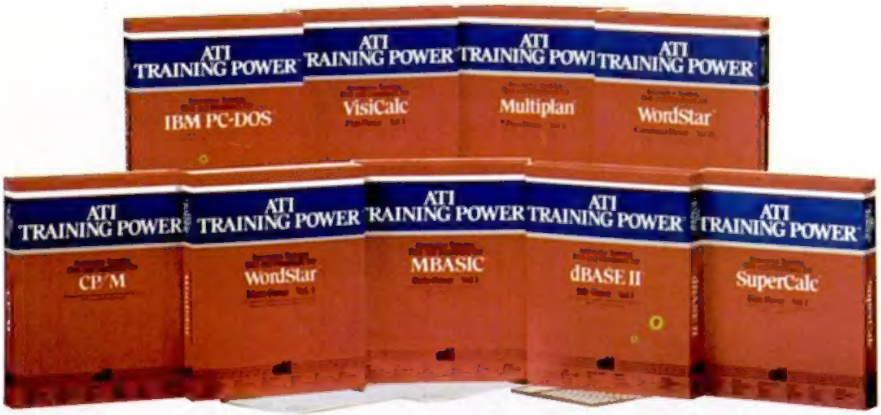
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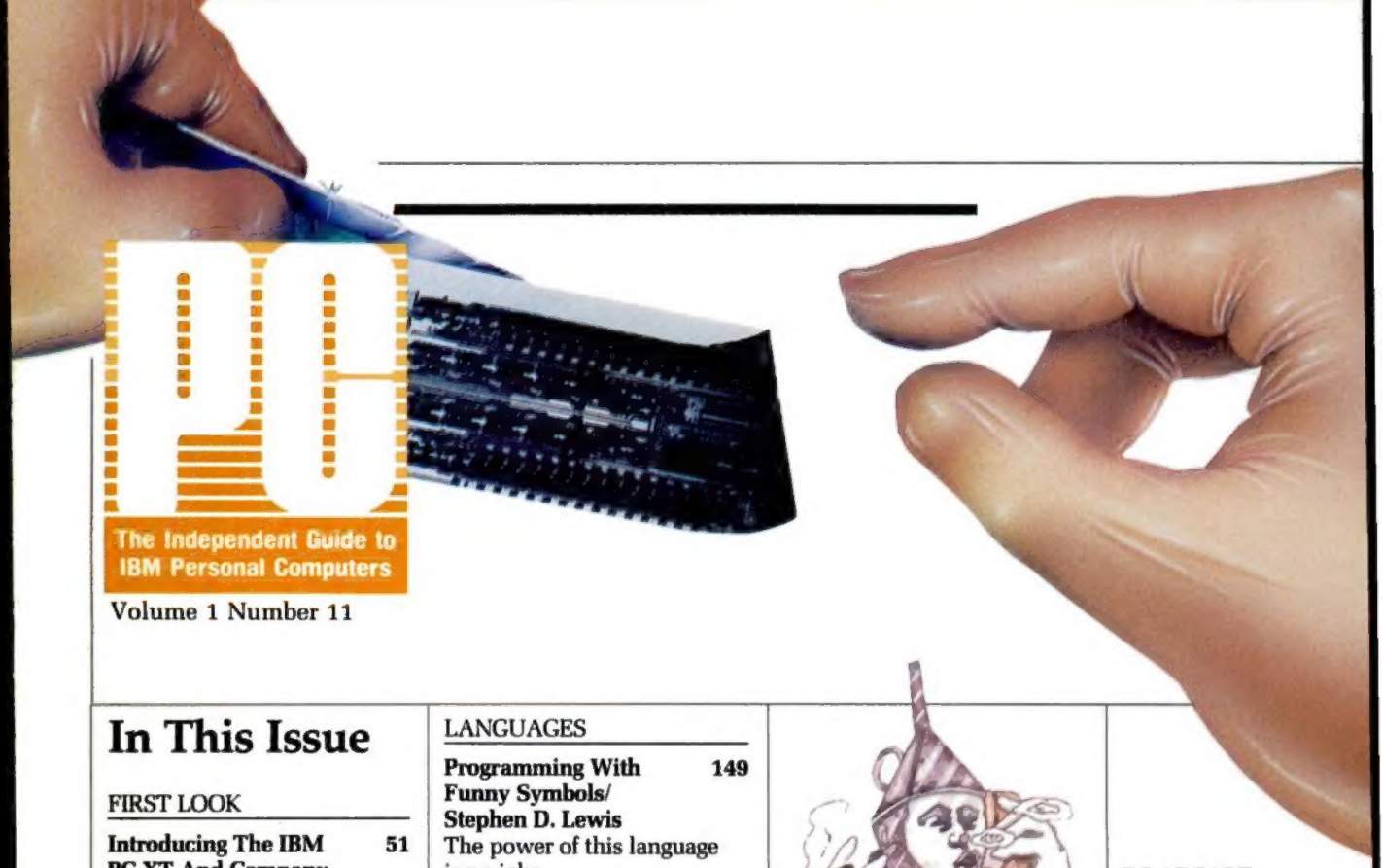
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In This Issue

FIRST LOOK

Introducing The IBM PC-XT And Company 51
Big Blue unveils a roomful of new products.

COVER STORIES

Avoiding The Worst: How To Care For Your PC/ Winn L. Rosch 90
An ounce of prevention . . .

Block That Bolt, Hey!/ Winn L. Rosch 97
Too much power corrupts.

Living With Lapses in Your Power Line/ Winn L. Rosch 112
Too little power disrupts.

Out Damned Spark/ Winn L. Rosch 124
Unfortunately, every PC has its static lining.

LEGAL

The Ultimate Backup: Insuring Your PC/ Paul Remer 139
Your homeowner's policy may not be enough.

LANGUAGES

Programming With Funny Symbols/ Stephen D. Lewis 149
The power of this language is no joke.

PC APLication/ Robert S. Lee 165
Faster than a speeding BASIC.

Keynotes/Fred Brack 307
To every key there is a function.

The Fundamentals Of BASIC/Fred Brack 317
All about strings.

DR LOGO: A New Start For Beginners/Vanessa Schnatmeier 422
The PC provides a home for sprites and turtles.

SOFTWARE

1-2-3: A Program You Can Count On/Frank J. Derfler, Jr. 187
What all the fuss is about.

The Ultimate Spreadsheet/George D. Hughes 257
Giving VisiCalc a run for the money.

Guess What's Coming To Dinner?/Corey Sandler 340
Take two eggs, one cup of sugar, one PC . . .



APPLICATIONS

BankAmerica Plugs In To PC Power/Colin Covert 208
Bank authorities uncover a conspiracy to compute.

The Automated Agent Helps Performers Get Gigs/ Hal Glatzer 286
On tour with the help of the PC.

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All work and no play . . .

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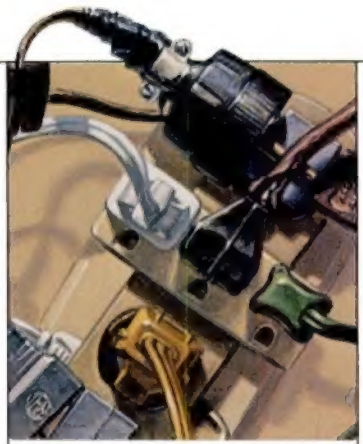
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1200 Baud: Speed Of Choice For PC Communications/Michael Eaton 438
How and why 1200 is the magic number.



SIGHT AND SOUND

The PC Talks Back/ Paul Somerson 369
If I only had a voice . . .

UTILITIES

SimpliFile Takes The Mystery Out Of File Names/Dona Z. Meilach 382
Overcoming the tyranny of BKSXLT.DAK.

PC PROGRAM EXCHANGE

How To Tell Time With TellTime/Lloyd Onyett 460
The big hand's on the 12, the little hand . . .

IBM EYE

Anatomy Of A Colossus, Part III/Kathleen Burton 466
At IBM, the future looms.

BOOK EXCERPT

Back To Basic/David A. Lien 537
Learning IBM BASIC for the Personal Computer.

DEPARTMENTS

From the Editor's Screen 25
Letters To PC 31
PC Comminques 61
PC Tutor 77
New On The Market 481
Club News 500
User-To-User 510
PC: Blue Book 515
Index To Advertisers 555
Wish List 560

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CROSSTALK	117

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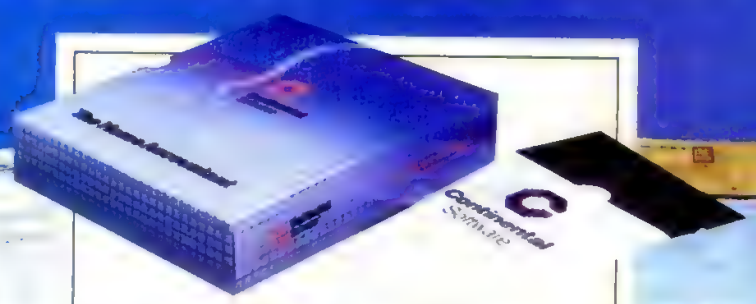
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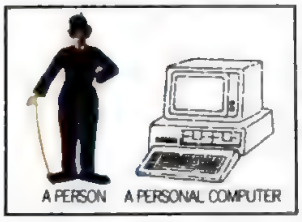
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Simple answers to your questions about the IBM Personal Computer.



If you're personally interested in personal computers, but want to know more, these definitions, descriptions and details should help.

"Just what is a personal computer, and how can I use it?"



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As with any new tool, you'll want to get comfortable with the IBM Personal Computer before putting it to serious use. You'll have some step-by-step reading, but our instructional literature involves you from the start. And the computer is on your side too—interacting with you as you learn.



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we offer programs that help handle
everything from accounting to
inventory and payroll record
keeping. We also have
carefully chosen programs for
educational use, intelligent games, a
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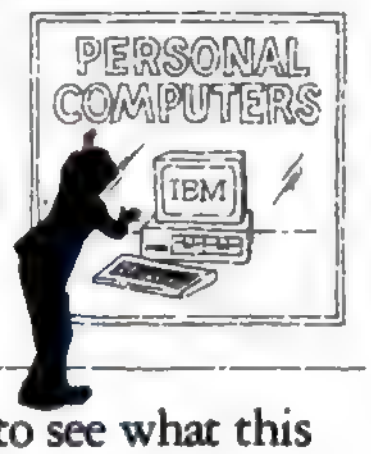
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Bidirectional*
80 characters/second
18 character styles
9 x 9 character matrix*
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(ROM) 40 bytes*
Color/Graphics
Text mode:
16 colors*
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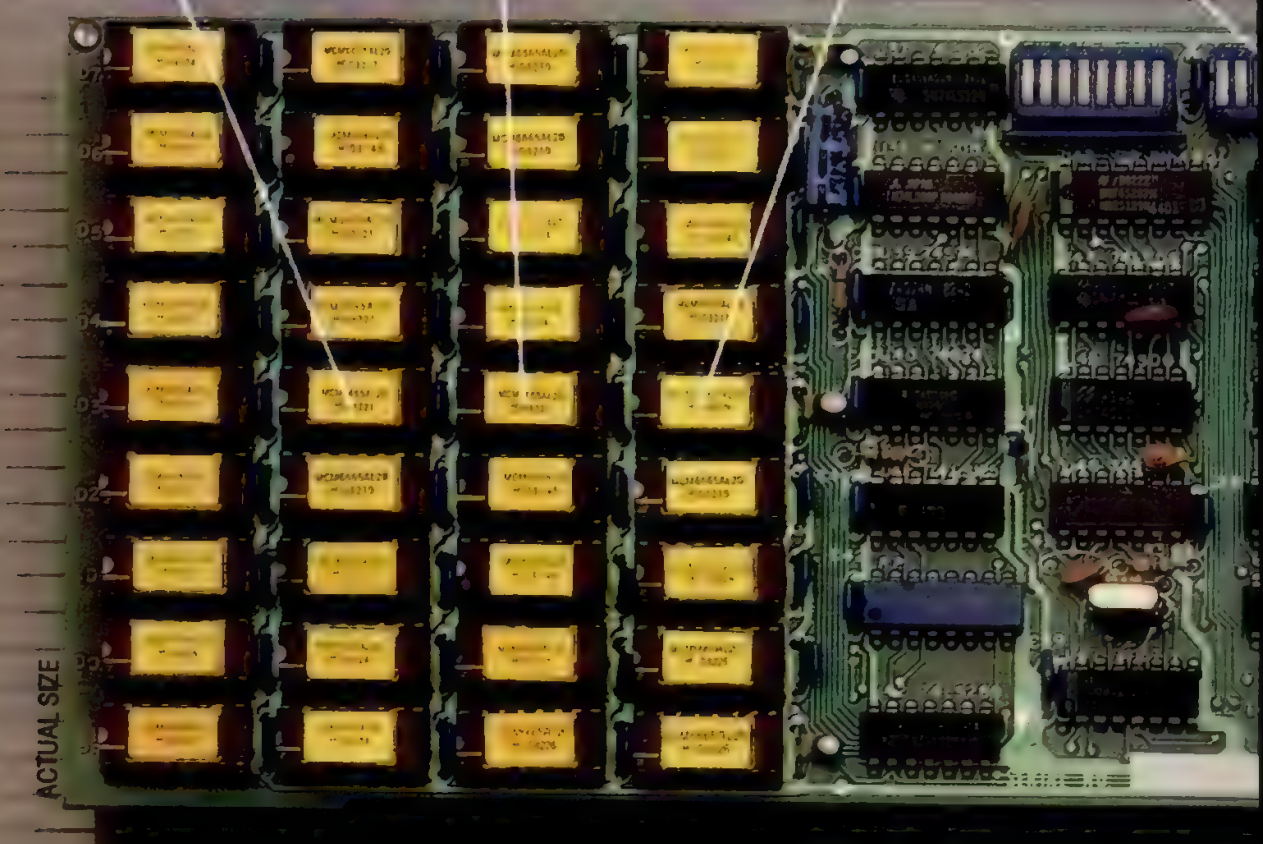
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spite a hectic day, a brutal deadline, and a
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Be A Friendly User



e all told that there comes a time, just ents before the end, when our entire flash before our eyes.

ly moment arrived considerably ear- hope) in the newsroom of a daily spaper where I once toiled. We were on deadline—and deadline for a r daily is as immutable as a brick . I was chasing after the front-page of a gasoline storage tank that had t into flames half an hour earlier.

was seated before a computer termi- tied into the newspaper's mainframe ng and typesetting system. The tele- ne in my right ear was connected to of our reporters on the scene. The phone in my left ear, which snaked nd the computer terminal to another across the way, went to an oil com- spokesman who was in charge of ying as much speculation, supposi- , and fact as he could.

There were copy editors hanging over

I WAS chasing after the front-page story of a gasoline storage tank that had burst into flames half an hour earlier.

shoulder. Behind them a photogra- r was flashing wet prints that had just n rushed from the darkroom. Across room, the city editor was waving at me tically. "I need it now!" he called. raced through the copy on the video een for one last pass before sending it off to the editors and the waiting presses.

Suddenly the screen image flickered slightly and the borders of the green type shrank just a fraction. Everyone around me recognized the message immediately: the computer system was considering whether to crash, a habit it had developed to an exceedingly fine degree of precision. Our computer never seemed to have any problems on Sunday mornings or New Year's Day or at other times when we would all have been perfectly happy to give it a few hours off. No, our friendly local computer system only went on the fritz on deadline, and then only when the front page hung in the balance.

And so, I dove for the Transmit button on the keyboard, the signal to dump the contents of the RAM memory of the terminal to one of the banks of tape and disk drives in the hermetically sealed computer room. If one could make the move quickly enough, the story could usually be saved; too slow and it was back to a blank screen and a red editor.

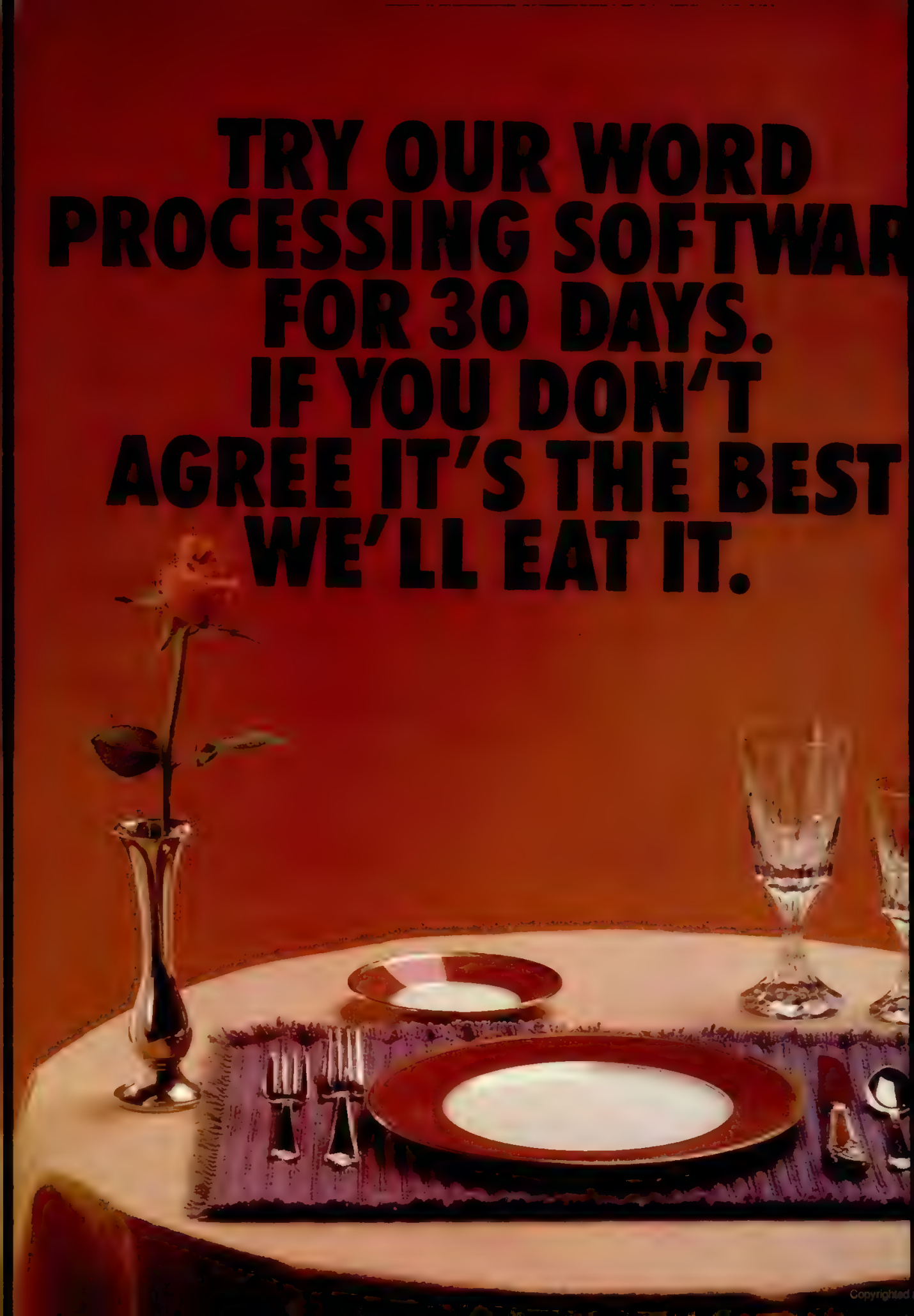
Perhaps I should consider it a tribute to our shared reflexes, for I was unexpectedly joined in the mad dash for the Transmit button by two editors and a reporter who were passing by. I think one of us actually hit the key—it was all such a blur—but I can't be sure, for all of a sudden there were three bodies tripping over the crisscrossed telephone wires.

And then my life flashed before my eyes. In what seemed like the most exquisite slow motion photography, the video terminal began to slide off the desk.

We all turned—in that same slow motion—to watch, our mouths dropping. The terminal cleared the edge and did a

Illustration Don (No Relation) Day

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CIRCLE 446 ON READER SERVICE CARD

ect half-gainer toward the floor.
eone moaned. And then the terminal
e within 2 inches of the floor and
ped back up, like some $10,000 yo-
t was saved from a collision by its
k black umbilical cord.
ne of us finally recovered enough to
hold of the bouncing terminal and

THE TERMINAL me within 2 inches of he floor and snapped back up, like some $10,000 yo-yo.

t gently back on the desk.
The screen was still on, and the mes-
read: "GASTANK.CDS stored at
5:06 a.m. Next command?"
By the way, the computer system nev-
id crash that day.

e Goes On

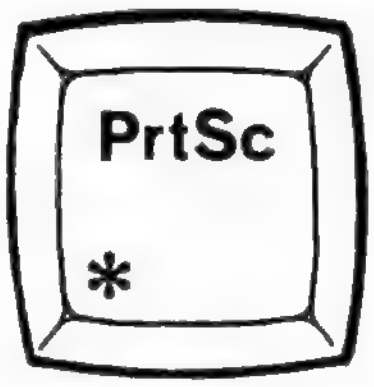
One of the current buzz phrases in the
ustry is "user-friendly." In this issue,
take a look at the flip side of that
erative: ways to be friendly to your
puter.
Regular contributor Winn Rosch offers
ckage of important stories designed to
keep your baby Blue in the pink.
'll learn about maintenance proce-
es, power line filters and surge protec-
, the inside story on static electricity
the outside line on how to set up your
n power company if you simply can-
afford a power outage.
Contributing editor Kathleen Burton
cludes her three-part "Anatomy of a
ossus" series, asking the question
hither IBM?"
Word processing users will do well to
ck our article about a trio of utilities
the ubiquitous *WordStar* before writ-
their checks. You'll also find reviews
he Select word processor for the IBM,
s an appraisal of a pair of financial
delers, *Target* and *Microplan*.
So, run right out and be nice to your
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e, it can be one of your best friends.

—*Corey Sandler*

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21

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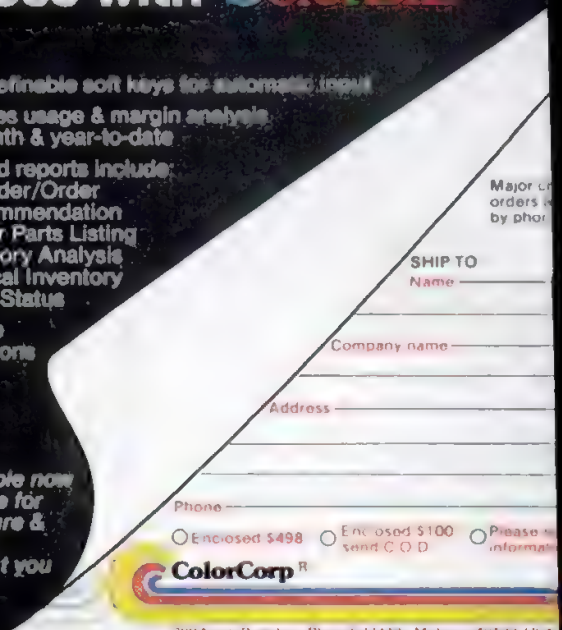


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etters to PC

Search of LOGO

articles on educational software and nes (Volume 1 Number 8) were espe- ly interesting. However, two items zzled us. In the Table of Contents, the cription of the LOGO article says, eymour Papert's delightfully simple guage, customized for the PC." The cle states that LOGO has been writ- for IBM by Interactive Sciences, Inc.) in California—but the article also ntions that this organization does not e any plans for marketing the IBM sion of LOGO. Your description in Table of Contents seems misleading. It is great to know that LOGO has n customized for the PC, but not y helpful to those of us who would interested in acquiring it if we can't our hands on it! Are there any other mpanies developing LOGO for the rket?

Your product reviews are excellent d helpful. Are you planning to review me finance software soon?

Mike and Cathy Hafner
Salina, Kansas

urs was one of many letters asking more information about ISI's LOGO. the author, Danny Goodman, stated, is a nonprofit organization with no ans to market its version of LOGO for e IBM PC. However, inquiries may be dressed to Interactive Sciences, Inc., 10 Harriet, Palo Alto, CA 94301.

A commercial version of LOGO, de- loped by Digital Research, will be ailable later this year. For more infor- ation, see "DR. LOGO: A New Start r Beginners" in this issue.

PC reviewed eight home finance pro- ams in Volume 1 Number 10.—Ed.

xponential Growth

ul F. Doering of Rochester, New York akes an interesting attempt at arriving the number of PCs sold per year. (Letters, Volume 1 Number 9). We bought our PC on November 1, 1982 from CompuShop in Dallas, Serial number



0478744. To follow his thinking, that would mean 377,032 PCs in 11 months. Assuming even monthly sales and not geometric progression, that would indicate 411,307 PCs sold during this 12-month period.

Ed Hagen
Oklahoma City, Oklahoma

In the "Letters to PC" column in Volume 1 Number 9, Paul Doering challenged readers to find a System Unit serial number higher than 180,000. I purchased my IBM PC on December 31, 1982 from a Computerland in the Chicago metropolitan area. The serial number is 231359. According to Mr. Doering's accounting that makes the total shipment of IBM PCs in 1982 at least 129,647 (231359 less 101712, the serial number on his PC purchased in October 1981), ignoring, of course, those units shipped in November and December 1981, but who's counting?

The fact of the matter is, the IBM PC has had great market success and is a truly useful tool for business and education. The exact number of units shipped is not all that important.

Michael Lang
Western Springs, Illinois

Double Time

Any chance you might switch to bi-weekly publication? My wrists groan every time a new issue of PC arrives. Byte magazine is no trouble since only 25 percent of the copy is really interesting to me, but PC gets read cover to cover, with each ad getting at least a cursory glance. I know that mailing costs would double, so going biweekly really isn't a feasible solution, but you folks gotta do something or my wrists are gonna go on strike!

Bill Siebert
Spencer, New York

Have you tried weight lifting? Please say you're kidding about the bi-weekly schedule. Please?—Ed.

February Fools

I know it's a bit early for April Fools, but take a good look at the picture on page 388 of Volume 1 Number 9. The *Economic Order Quantity* may provide "what-if" analysis, but how did they manage to run the program with the IBM PC backward? Obviously the negative was reversed when printed!

Anyway, keep up the good work. I look forward to reading each issue. Thanks for finally providing reader service cards.

Patricia A. Leonard
Millbrae, California

The Perimeters of "Parameter"

I enjoy and value *PC*, and find in it many interesting and useful articles. Generally, your articles have the virtue of clarity. I am amused and occasionally distressed, however, by the constant misuse of one word.

Number One

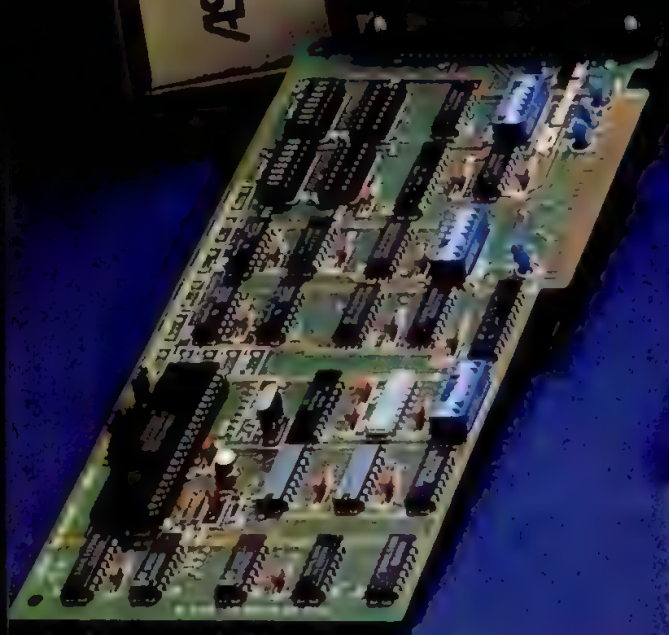
Communications



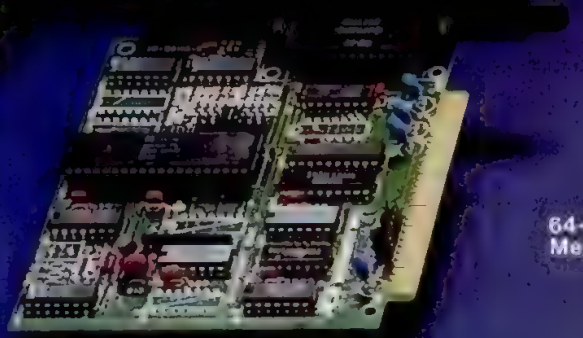
Networking P

to be announced
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- Hard Disk Res
- 1 Mb
- Mainframe P
- Communica

Async

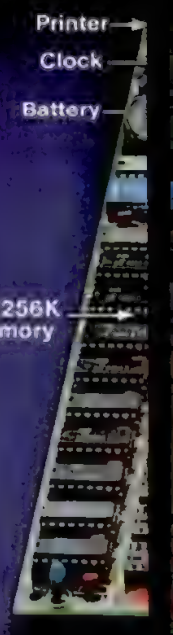


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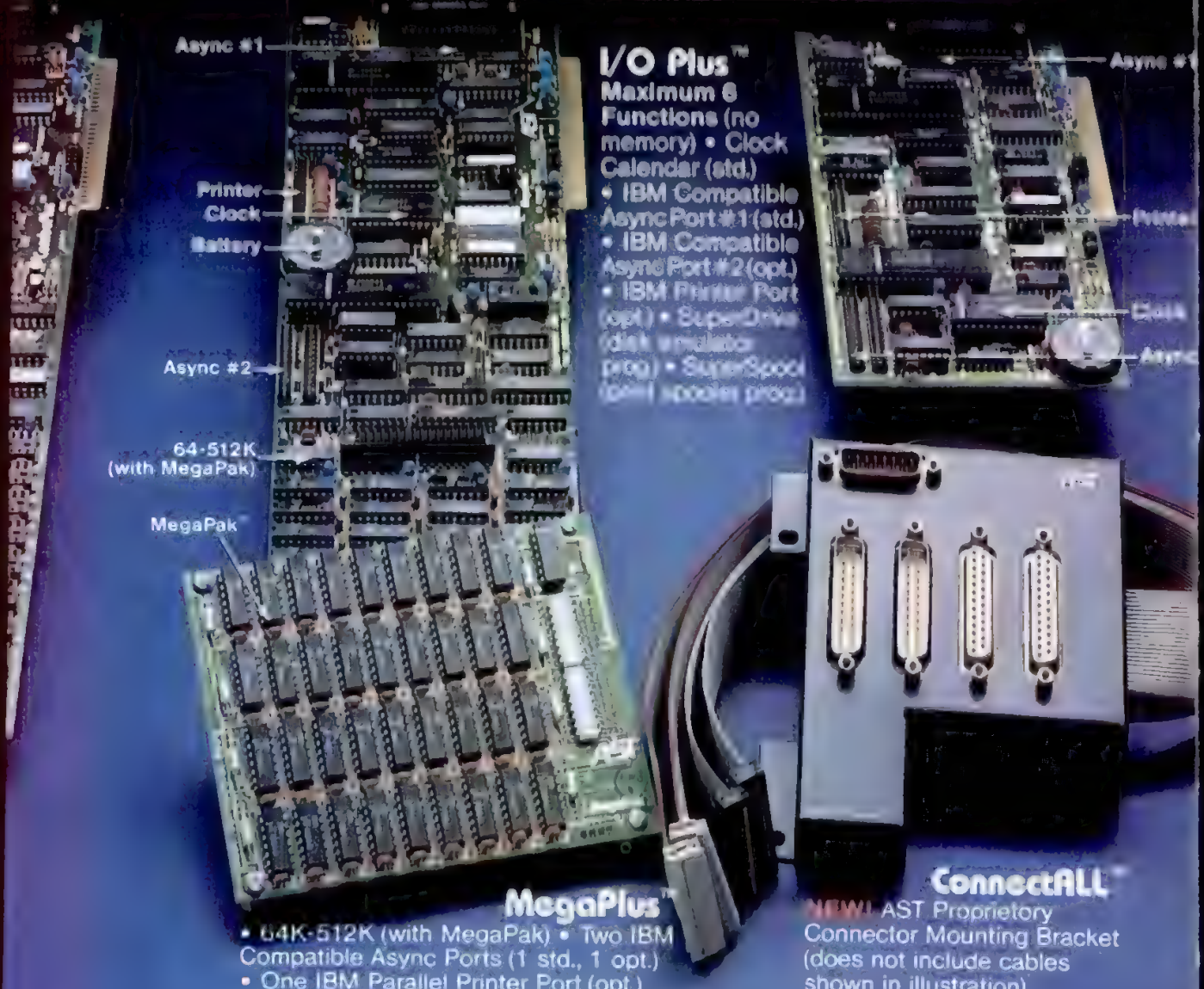
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Letters to PC

You guessed it. The word is *parameter*. I am not a language purist and have learned to accept *parameter* as jargon for *perimeter*, although this is not at all what the word means. In *PC*, however, it has become a wild-card word. I have seen it used as a synonym for *perimeter*, as well as *definition*, *specification*, *dimension*, *feature*. . . .

We all remember Alice saying that when she used a word it meant what she wanted it to mean. We could probably learn to live with her idiosyncracies—provided they were consistent. If you are going to use *parameter* incorrectly, you should establish consistency in the error. Otherwise you sacrifice the clarity of expression that I find so much a virtue in *PC*.

William G. Harrington
Cos Cob, Connecticut

Thanks for your letter. The defense of straightforward English requires constant vigilance. As it happens, the imprecision of parameter *has been the subject of much discussion here lately. The eighth edition of* Webster's New Collegiate Dictionary*—widely criticized for its permissiveness, we realize—offers* characteristic, element, *and* factor *as synonyms for the troublesome* parameter. *Still, we agree with you and plan to include appropriate guidelines in our next style revision.*

By the way, it was Humpty Dumpty, not Alice.—Ed.

Instructions

The article in Volume 1 Number 8 entitled "Educational Software for the PC" mentioned that *The Instructor*, a software tutorial introduction program for the IBM PC, had a minor glitch that produces unreadable text if the color version is run on a monochrome screen. This point needs further clarification as it can be a common problem and may be of general interest to your readers.

From *The Instructor*'s viewpoint, three screen types are possible and each requires different program treatment. The three screen types are: 1) the IBM Monochrome, which is connected to the Monochrome Display/Printer Adapter, 2) a color monitor connected to the Color/Graphics Adapter, and 3) a monochrome monitor connected to the Color/Graphics Adapter. This last type of screen is not an IBM Monochrome, but is manufactured by Zenith, NEC, and others.

Most programs that run in vivid color may have a screen presentation problem when run on a system configured as indicated in number 3 above. This is because the program outputs color commands to the Color/Graphics Adapter, which then passes these on to the monochrome screen (which cannot display color). The result is unreadable text.

The original version 1.00 of *The Instructor* did not handle a monochrome monitor connected to the Color/Graphics Adapter, but handled the first two screen types just fine. The current version 1.01 of *The Instructor* (available since November 1982) is designed so the one disk produces readable text on all three screen types.

Diane M. Dietzler
Vice President, Marketing
Individual Software Inc.
Redwood City, California

Uneasy Spelling

PC's guide to word processing programs (Volume 1 Number 7), illustrating the available features of 20 word processors, contained an error regarding our corporate name. It is Norell, not Novell (another firm).

The correct name of the Norell word processing system is *Easyword Processing System*. This package consists of the *Easyedit* full-screen text editor and the *Easytext* format processor. The word processing chart listed *Easytext* as th name of our word processor.

And, while the "spelling checker box for *Easyword* was not marked in word processing chart, Norell Data S tems Corp. does offer a spelling chec program. The name of that product i *Easyproof* spelling checker.

Melvin L. No
President, Norell Data Systems C

Pagination Problems

Congratulations on a fine magazine. I think it would be kind to your reader you could number more of the pages, though. The lack of page numbers makes the Table of Contents a little harder to use, and the Index to Adver ers much harder to use.

Bob Car
Houston, Te

The problem is that there are so many pages, we run out of fingers and toes count them on, even when we enlist t aid of our friends in the print shop. We'll try, though. Anyone know of a good computer?—Ed.

Notes and Comments

I certainly want to add my "well done to the growing list of satisfied readers PC. It is well-written. In spite of the le ter you received to the contrary, I espe cially appreciated your unbiased artic on "*VisiCalc vs. SuperCalc*" (Volume Number 4). It allowed the reader to loo for the features he wanted and make th appropriate decision. I feel this is con firmed by the fact that Gene L. Thomas wrote to say he purchased *SuperCalc* a a result of that article; I purchased *Visi Calc* as a result of the same article.

A welcome addition to your magazine was the inclusion of usable programs like "Baking Pi in Your PC" (Volume 1 Number 8). However, you reduced the size of the picture of the actu al program to the point that it lost some

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CIRCLE 110 ON READER SERVICE CARD

Letters to PC

of its definition.

While I don't expect *PC* to become the "Nibble" of IBM, it would be nice to have at least one usable program included each month. What about something on machine or assembly languages? My local dealer says that the PC is not well-suited to either. Neither he nor IBM has provided any help in this area. Most of my machine language experience goes back to the 6800 chip. I am sure I can get the 8088 to "jump through the hoop" if I am given enough of the proper information.

After being so dissatisfied with the *Screen Writer II* on the Apple II Plus, I am very careful about selecting a word processor for the IBM. I devour each and every one of your word-processor product reviews looking for the right one. *The FinalWord* seems to come as close as anything thus far to what I am looking for. In spite of their contention that it provides true proportional spacing, I saw no such mention in your review. Did I miss it?

Bob Nellans
Argos, Indiana

Mark of the Unicorn, distributors of The FinalWord, *do claim true proportional spacing with several printers listed in that program manual. This feature was not tested for our review. We suggest you consult your dealer or Mark of the Unicorn for details.—Ed.*

Praise for ProKey

Bravo! At last, *PC* has discovered *ProKey*!

A year ago I purchased my first computer; 4 months later I purchased *ProKey*. If I had it to do over, I might reverse the sequence. David Rose, the author of *ProKey*, has done an excellent job of providing the new computer owner with a truly useful tool. This little gem in digits is on every operation disk in my personal file, including *WordStar*. The expenditure for additional RAM to accommodate *ProKey* is reasonable at twice the price.

Although your review (Volume 1 Number 9) was very accurate as to *ProKey*'s features, in my opinion you neglected to elaborate on its optimum feature as a Programmer Aide. When LOCATE 5,20:PRINT CHR$(186):LOCATE 6,20:PRINT CHR$ (186) can be replaced with a two-keystroke entry, programming can become truly fun even for us new computer owners.

Keep up the good work and deliver additional gems such as *ProKey* to your staff for review.

Gene Preece
Renton, Washington

Keyboard Katastrophes

Criticism of the IBM keyboard layout is interesting but misses one of the main problems—its fragility. Three of the four PC owners that I know have serious problems with their keyboards after less than one year of operation. One has no X-key function. Mine sometimes gives out random even numbers when my hands approach the top row of keys. Another has suffered a massive failure, generating 301 codes (that is, 01 or 03 or 05 or 07-301) after being attached to my machine. All three systems were purchased in the U.S. (California and New Hampshire) from eight months to a year ago and have been used mostly for word processing, program development and communication purposes. Are other uses similarly afflicted? Should there be an auto-industry type recall of these shoddy products?

R.J. Rahn
Ste-Foy, Quebec

We don't know if this is just a run of back luck or something more significant. We know of three keyboards in our office that receive very heavy daily use with no reports of problems. Readers?—Ed.

With all the complaining about the P keyboard (shift key placement, combined cursor and numeric keys, etc.) why hasn't a peripheral manufacture come up with an alternate keyboard? The standard PC keyboard is $270; s ly a replacement could be marketed about that price. IBM could do its pa and sell systems without a keyboard, admit they were wrong and redesign themselves.

And for those who would prefer t make do with some minor improvements, how about a modification kit existing keyboards (reduce the size o the + key, move the integer-divide k to the lower right corner, and increas the size of the left shift key so it bord the z key).

With respect to the magazine, I am sure many people who weren't on bo from the beginning would want to co plete their sets with Issues 1 and 2, which are now out of print. PC shoul reprint a combined special edition!

David Horow
Yardley, Pennsylva

For information on an alternative keyboard for the PC, see "Key Tronic's So Touch," page 347, Volume 1 Number 9.—Ed.

PC is Catchy

I recently acquired a PC in my office and I am just getting used to it after many years on mainframes. I still do much of my work on mainframes and is both challenging and exciting to int grate all the resources at my disposal. actually access several mainframes an have access to several terminals includ ing a new graphics terminal and plotter.)

The major problem I have is people in the office coming in just to look at the equipment and see what I am doin Now another office would like to get a microcomputer and, since the staffers there trust my judgment, they would

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CIRCLE 222 ON READER SERVICE CARD

Letters to PC

like to acquire a PC. However, a substantial portion of their computer work has been done in APL. I know that APL-80 is available, but is there an APL available for the IBM PC? If you or your readers are aware of one I would greatly appreciate learning about it. If I had the time I might try creating one using my C compiler.

John W. Broderick
Springfield, Virginia

You are correct—APL has arrived, and for the PC, too. See "Programming With Funny Symbols" and "PC APLication" in this issue—Ed.

Bothersome Bifocals

Almost every illustration in PC shows the monitor sitting on top of the disk drive, which sits on a desk top 30 inches high. The furniture manufacturers advertising in PC show the monitors even higher. Don't any of the designers wear bifocal glasses? I know computers are for young people, but even those kids growing up on computers now will wear bifocals someday.

In my opinion, the monitor should be designed to accommodate by placing the disk drive on top for us old duffers.

D.G. Jedele
University of Illinois
Urbana, Illinois

We sympathize. Those of us who wear contact lenses would appreciate a little less glare, too. You might look into an accessory keyboard extension cable that would allow you to place your computer off to the side and have your keyboard directly in front of the lowered monitor.—Ed.

Vendor Validity

I read with interest your review of the Crosstalk communications system (Volume 1 Number 9). I would like to relate my experience with Crosstalk to you and your readers.

I have had experience with a number of communication packages. My particular needs are somewhat unique since I upload/download APL programs. The APL language uses special characters as operators that are formed by "overstriking" two characters. For instance, the "factorial" operator is formed by typing single quote-backspace-period (prints as !); another operator is slash-backspace-minus (÷). Few communication packages allow the backspace character to be treated as text. Rather, it is filtered out or treated as a control character (usually "erase"). ST-80, the defacto standard communication package on TRS-80 computers, contains a utility that allows specification of the disposition and substitution of any control characters the user desires. I have not seen any other packages allowing this, including Crosstalk.

Since Crosstalk filtered out my needed backspaces, I placed a call to Microstuf. I spoke to someone who listened to my problem and promised to call back with a solution. Sure enough, he did. Over the phone, he dictated step by step what to do as I keyed his instructions into Debug on my PC. It took only a few minutes and when he finished, Crosstalk downloaded APL overstrikes exactly as I needed.

I am very satisfied with the package. The documentation is excellent and everything works. It even allows me to pass data between my PC and TRS-80 running ST-80. I find the command mode structure (as opposed to menu driven) convenient, especially with a small reference card I made for it sitting on top of the keyboard. The only shortcoming I found was that a download to memory must fit into one segment, limiting the volume to 26K. I was informed, however, that the next release, due out soon, will not have this restriction.

By far the best feature of Crosstalk is the way Microstuf stands behind the product. I have read many letters in your magazine from users complain that the vendor was unwilling to he them with their problems. Unfortun ly that seems to be prevalent in the dustry. Perhaps identifying the supp ive and non-supportive vendors for ers whenever possible will help to i prove the industry.

George F. W
Red Bank, New Je

Friendlier Ware

All of us here at FriendlySoft were v pleased to see Arlene Berlin's review our Friendlyware PC Introductory Se "The Best Little Programs in Texas" (Volume 1 Number 8).

I was more than a little shocked, however, when I read, "The only dis pointment with this package is that there is no warranty if the programs prove defective. The risk is entirely t user's." As any of our customers who had problems can attest, this is simpl not the case at all.

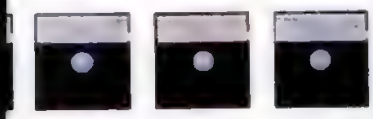
In fact, I wouldn't hesitate to say t FriendlySoft has one of the best supp programs in the industry, and it will come even better very soon. We curre ly maintain a 24-hour Hotline that is swered by programmers or manageme personnel — rather than just a voice that takes numbers. Should a custome have a problem that cannot be handle over the phone, we'll send a free replacement or correction within 48 hou of receipt of the defective product.

In addition, we will soon introduce the most extensive product support pr gram in existence: The Friendlyware "No Fine Print" Lifetime Guarantee o our Master Diskettes. I suspect that these policies will raise more than a fe eyebrows. They exemplify our commit ment to the very best product support possible. We will also be eliminating a major customer problem, formatting an transferring system and language to back-up disks, by handling these proce

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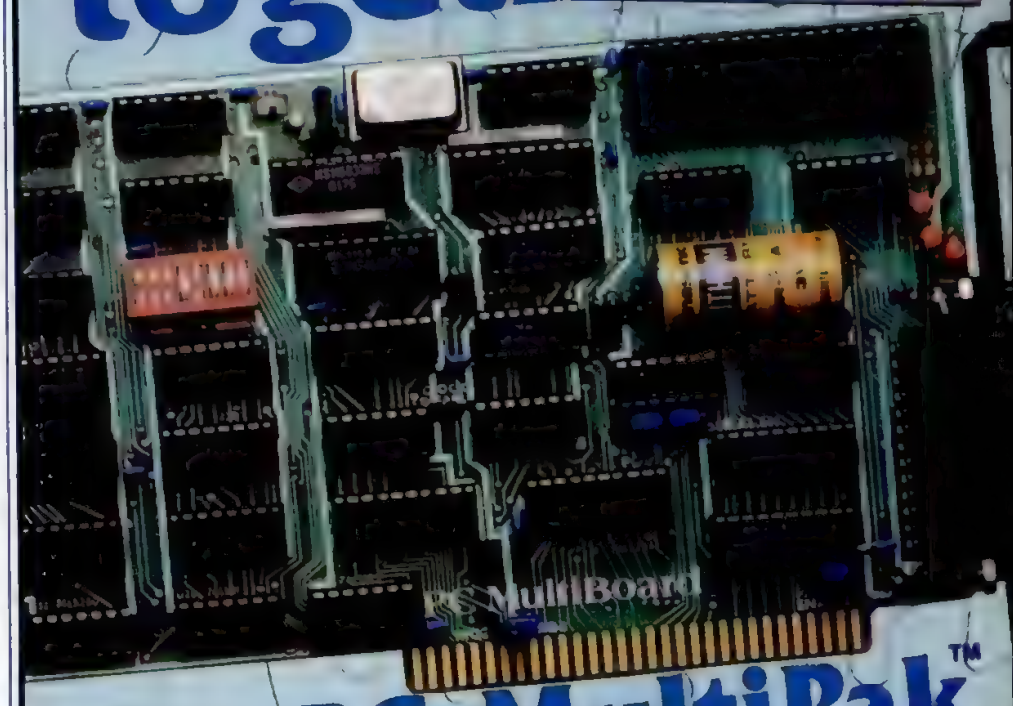
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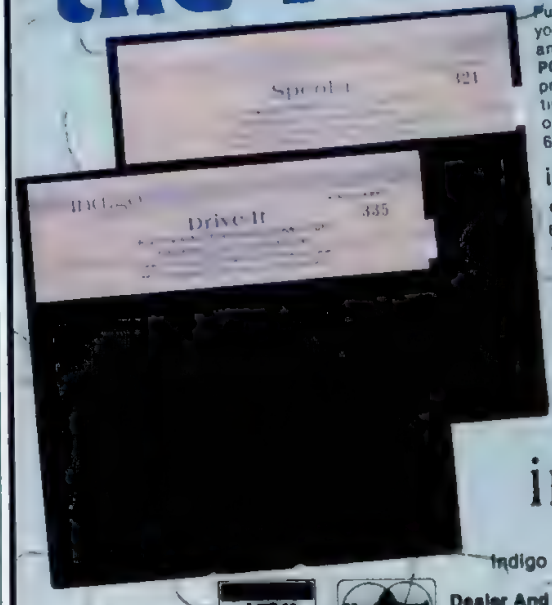
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policies and objectives in the area of
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k you for the otherwise very posi-
and accurate review.

James J. Davis
President
FriendlySoft, Inc.
Arlington, Texas

st for the Bucks

umber of letters and articles in *PC*
e expressed an urgent need to ac-
re larger disk capacities. Some own-
of early units with single-sided disks
upset that the conversion to double-
ed disks is so expensive. Other au-
rs are convinced that a system lack-
Winchester support is inadequate.
My PC was delivered a year ago. My
mediate reaction was to desire more
k capacity. I have a different view
w that I have acquired a half-meg
mory for my PC. This memory was
atively inexpensive, and current ads
present even lower costs than I in-
red (on the order of $500+ for
2KB). I spent a weekend writing and
bugging virtual disk support and a
nt spooler based on this additional
mory capacity, and my storage prob-
ms evaporated. I get better perfor-
ance than any Winchester disk can of-
, and having four disk addresses of-
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es. Rarely do I encounter a storage
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ssibly be added to the PC. I no longer
ally need a hard disk, though I recog-
ze that I might if I were to go into ad-
nced database applications. For mun-
ane edits, compilations, etc., this large
emory capacity is all that anyone could ask for. It actually outperforms a hard disk!

David F. McManigal
Stormville, New York

Flight Failure

First-time contributor Will Fastie has already performed a great disservice to PC readers. Nowhere in his gushy review of Microsoft's *Flight Simulator* (Volume 1 Number 9) does he even allude to that which is so clearly stated on page 4 of the program's manual: that the flight simulator will only produce black and white on RGB monitors.

I have no doubts that Mr. Fastie would have waxed a bit less ecstatic had he flown over grey land, glided above greyer water, soared through light grey sky, and executed a three-pointer on a grey airstrip. The whole experience is like flying out of LAX when the fog's in.

A review of a software product in your magazine should be just that. It should cover the better points of a program along with its limitations. Fastie's "my most unforgettable character" approach masquerading as a serious software review is unconscionable.

As penance, I think PC owes those readers who on its recommendation purchased the flight simulator, only to be disappointed and misled, some sort of article on radio frequency modulators and home TVs: what works with what. As my contribution to your initial research on this article, the Sup'R Mod marketed by IBM fails with a Zenith System 3.

Trevor Thomas
New York, New York

Will Fastie replies:
Touché. I did not have a chance to try the product on an RGB monitor. No excuse, of course, but the truth. I was told by Microsoft about the black and white display, but since I did most of my testing on a black and white TV, and since the display there was very satisfactory (especially with a cloud layer), I never thought black and white per se was a problem. I have since seen the program running on an RGB device, and I agree with Mr. Thomas' remarks.

Nonetheless, I stand by my unqualified recommendation of the product. It is truly an amazing program, and an excellent simulation. If you are interested in flying, you are not going to be disappointed. You certainly will enjoy the product more if you use a composite monitor or TV. And as for my style, well, why not be entertained by a review of an entertainment product?

Dunce Cap

We are honored to be included in your article "The PC Goes to School" (Volume 1 Number 8), and write only to offer the minor correction that Saint Andrew's School is affiliated with the Episcopal Church.

In passing, may I note that you produce an attractive, articulate, and highly useful magazine.

John P. Cotton
Headmaster
Saint Andrew's School
Boca Raton, Florida

Correction

Due to an editing error, PC omitted the address for *E-Mail*, an electronic mail facility discussed in "The Electronic Revolution" (Volume 1 Number 9). For more information about *E-Mail*, write to: Jones Engineering Associates, Inc., P.O. Box 26134, Charlotte, NC 28213, (704) 455-9616.

PC welcomes letters from readers. Write to: Letters, PC, One Park Ave., New York, NY 10016. Letters published may be edited.

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Suggested retail price is $95.00.
For use with IBM PC.



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CIRCLE 453 ON READER SERVICE CARD

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ARE YOU STILL LETTING YOUR PRINTER TIE UP YOUR COMPUTER?

While your printer is running, your computer is tied up. You can't use it for processing, computing, data entry. Nothing. All you *can* do is twiddle your thumbs until the program is finished.

Pretty ridiculous.

MICROBUFFER ALLOWS YOU TO PRINT AND PROCESS SIMULTANEOUSLY.

You just dump your printing data directly to Microbuffer, whoosh!, and continue processing. No waiting.

Microbuffer accepts data as fast as your computer can send it. It stores the data in its own memory buffer then takes control of your printer.

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Microbuffer In-line (just one in the full line of Microbuffers) is a stand-alone printer buffer available in both parallel and serial versions. Its front panel features three touch sensor controls: one to clear the buffer, a pause button to halt printing and allow data to pass around the buffer (for log-on and other tasks), and a copy button to reproduce the last document up to 256 times without any computer intervention. The serial stand-alone will support different input and output baud rates and three handshake modes.



The 32K Microbuffer In-line starts at $299, $349 for 64K, and 64K add-ons (for a total of up to 256K) are just $179. The Microbuffer requires no user modification of software — it installs easily, in seconds.

Other Microbuffer models include Microbuffer II for Apple II computers and Microbuffer/E for Epson printers.

MICROBUFFER FROM PRACTICAL PERIPHERALS.

So what are you waiting for? Write to us for more information or ask your dealer for a demonstration.

When you see how much freedom Microbuffer will allow, you'll understand why it's so silly to be without one.

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Data Design™ is a full-feature, relational data base management system (DBMS) for people who value their time as well as their money. Written expressly for the IBM Personal Computer, Data Design takes advantage of the special function and editing keys so you spend your time working, not learning.

Waiting for a sort could put you out of sorts.

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Data Design even lets you enter and print information on forms you design to look just like the ones you use everyday—with all calculations done automatically.

While other DBMS users are getting sorted out, you can be getting results in just the formats you need.

It helps to memorize one key word:



Press F1 whenever you need help and you'll be greeted by a tutorial that addresses whatever you're working on *at that moment!* While users of other popular DBMSs are still memorizing program commands, you'll be sped along your way by menus and comprehensive help screens.

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Data Design is the only major DBMS that allows telephone transfer between any two Personal Computers, so you can communicate instantly and accurately across the street or across the country.

Data Design also lets you make those all-important back-up copies without leaving the friendly menu-driven environment you've come to know and love. In the event of a power failure, it rebuilds the data base you were working on.

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Data Design works with a 128K IBM PC with double-sided drives and supports hard disks.

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ST LOOK/COREY SANDLER

a flurry of activity, IBM announces a family new products and price cuts on a host of iliar ones.

eXTra! eXTra!

ntroducing The PC-XT And Company

it the PC "One-and-a-half." IBM ped a shoe in New York City in early h, when it announced the Personal puter XT, an enhanced version of the at includes a 10-megabyte hard disk, expansion slots, and a new mother- d with extra memory. Also an- ced were a high-resolution color itor and a set of expansion chassis for the PC-XT and the original PC. The hard disk system can also be used the PC.

o drive the new peripherals and oth- evices, IBM released DOS 2.0 and IC 2.0, which do not replace the 1.1 ions but are designed to be inter- geable. According to IBM, the new will run any software that operates on PC. Programs written expressly to advantage of the new DOS 2.0, how- , may work only on the XT. A full ew of DOS 2.0 will appear in the next e of PC. A new word processor and a set of accounting programs were also ounced.

And in an aggressive move to sew up n more of the personal computer mar- IBM lowered the price of much of the sent PC line of computers and hard- e. A basic PC system with 64K of M, a keyboard, and one single-sided drive will list for $1,864, down 15 cent from the previous price of $2,205. ilar price reductions were made ughout the product line.

This was not the shoe everyone was ecting to fall. There was no mention of "Peanut," the "Popcorn," the PC-2, or of the other products that were the subjects of various rumor mills through the fall and winter of 1982-83.

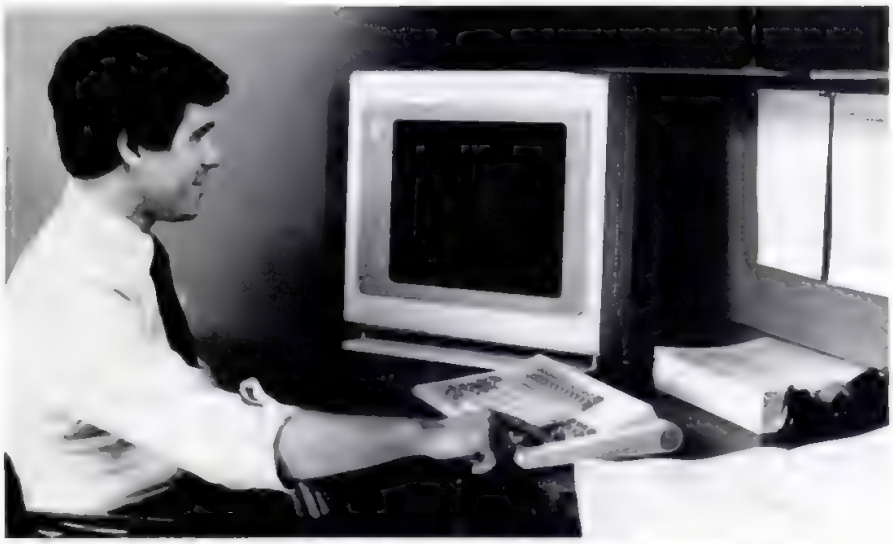


The IBM PC-XT in its basic configuration. From the outside, it looks like its forbear, except for the lack of a slot on the hard disk and a demure "XT" on the silver IBM name plate.

IBM did announce an upgrade to its popular business display terminal, the 3278, which enables users to alternate their PCs between communication with a mainframe and desktop computing. With the 3278, data can be readily exchanged between the PC and the mainframe system. This upgrade, observers said, may greatly increase IBM's desktop computing presence among established accounts.

In a glimpse into what may be the future of display units, IBM also unveiled its long-awaited flat screen gas plasma display terminal. The IBM 3290 information panel can display more than 10,000 characters of data in a wide variety of formats on an amber screen that measures 10.7- by 13-inches. The viewing area can be divided into quadrants to provide access to four different applications—in effect, allowing the device to function as four separate concurrent terminals. No plans were announced to link the plasma display directly to a PC, although an IBM spokesman refused to rule out any possibility. The new display will sell for $7,100.

The PC-XT base system, priced at $4,995 at IBM Product Centers, features 128K of RAM, which can be increased to 256K on the motherboard without using



IBM's 3290 flat screen gas plasma information panel may be the harbinger of things to come. The screen can display nearly 10,000 characters and can also be divided into as many as four separate work areas, each of which can be processed concurrently. No plans for immediate adaptation to the PC were announced.



An IBM representative demonstrates the PC-XT and the new Peachtext *word processor for* PC *editor Corey Sandler.*

an expansion card. The central processing unit (CPU) remains the Intel 8088. The base system also includes a 10-megabyte fixed hard disk drive, a double-sided floppy disk drive, and an asynchronous communications adapter. The new XT includes eight expansion slots, although one is given over to the asynchronous board, one to the hard disk controller, and one to the floppy disk controller. Three of the eight slots are shorter than the slots on the PC, and all the slots are slightly closer together.

With an optional expansion unit installed and with maximum memory, the XT and the PC can store nearly 22 million characters of information, the equivalent of 11,000 double-spaced typewritten pages.

DOS 2.0, which will sell for $60, allows use of standard IBM double-sided disk drives with a 360K format, an increase of slightly more than 10 percent in storage. The operating system—slightly longer than the DOS 1.1 files—will support one or more disk drives or fixed disks. File space can be allocated dynamically as data is added. Directories are "tree-structured"; subdirectories within directories allow quick, logical organization of information from the large-ca ty hard disk.

Other features of DOS 2.0 include port for "job stream" sequencing of grams as batch files and support of c tional logic, a graphics screen dum the printer, redirected input/output example, keyboard input and direct

THE PC-XT can be increased to 256K on the motherboard withou using an expansion card.

put to a file), piping (output from prog "A" used as input to program "B,") a background file print utility that per simultaneous file printing with o activity.

The IBM color display features a 1 inch screen capable of displaying characters in 16 colors against on eight background colors. The mon is housed in an enclosure simila that of the monochrome display u with the addition of an on/off swit

PeachText, a new word process package for the PC and PC-XT, v retail for $400. It will be sold alongs IBM's *EasyWriter*. Also from Peacht Software is an upgraded set of busin software packages for *General Led Accounts Receivable, Accounts P able, Inventory Control,* and *Payr* Users who already have versions 1.0 the Peachtree Accounting System m upgrade each program to version through authorized IBM dealers a cost of $120 for each program.

The XT will be produced at IBM manufacturing facility in Boca Rat Florida. In June, the new model will available in Europe and the Mid East. It will arrive in the Far East May, the company said.

Next month, PC *will include full deta on the new IBM product announcemen together with hands-on reviews and an yses.*



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it gives your PC professional system expandability

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Now, there's a high quality expansion board for your IBM PC that combines:

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But beyond that, "answerRAM" is also the most comprehensive I/O board available — with two serial communications ports and one parallel printer port, fully wired — read to go. Best of all — memory and all three I/O ports use only one slot!

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"answerRAM's" I/O capability .n connect your PC simul-:isly to a letter quality printer, a peed printer, and a data service al area network. Now, you can e most appropriate printer for b — without fussing to change : or wasting your time. Or, you :cess a data service or download rom your company frame computer, ut discon-ng your er.



ıy buy a board that will limit fu-xpansion, when "answerRAM" the same as less functional is?

. "answerRAM" you get the most f one expansion slot — saving 's for future enhancements — so system can grow as your needs .

best communications 'ace — hands down

. a close look at what is required e the available I/O ports offered her multi-function RAM boards. only are there fewer ports than verRAM" provides, but nearly all ire you to modify the board, add ectors or use up additional slots ilize all their I/O ports.

'werRAM" is designed for busi-users who need a professional tion. All I/O ports connect ugh a single, heavy-duty 37-pin nector, rigidly mounted in the dard rear slot of your IBM PC — like it belonged there. No flimsy on cables snaking around the sis. We've even made a unique, y-duty, shielded, "3-into-1" cable ttaching all peripherals.

olutely no clock — here's why

ike other boards, "answerRAM" does not include a board-mounted clock — by design. Your PC has an internal clock/calendar. True, it needs to be initialized each time the system is started, but board-mounted clocks that try to save you that trouble create new problems instead:

- they use address space that may conflict with future enhancements
- they must be disabled if your PC clock is to be synched with a network clock
- you must carry the clock software on all your system disks

We put our clock on our disk-controller board where it belongs.

Software to process faster, print more conveniently

"answerRAM" comes complete with software to make your additional RAM function like an electronic disk or as a print spooler. And we've included a nifty piece of software that lets you toggle the system's default printer port from one port to another with just a keystroke.

Sample Configuration



Comparison Chart

	2 Serial ports standard	1 Parallel port standard	I/O ports "ready-to-go"*	Electronic Disk	Print Spooler	Default Printer Toggle	Clock Calendar	Uses only 1 slot for all communications; Mfg. supplied cable connectors**	
ANATRON "answerRAM"**	●	●	●	●	●	●		●	●
AST ComboPlus**		●		●	●		●		
QUADRAM Quadboard**		●		●			●		
SEATTLE RAM+**				●					NA
TECMAR ALLinONE**		●		●	●		●		

*all I/O ports factory-wired to all necessary connectors — no user modification required
**manufacturer's own cable available for interface to peripherals

Specifications:

Memory: 64K, 128K, 192K, or 256K with parity, just as IBM installed

I/O: 2 Asynchronous Serial ports
Configured as COM1 and COM2
Programmable, for 50-9600 baud; 1, 1.5, or 2 stop bit generation; even, odd or no bit parity, 5,6,7, or 8 bit character communication
1 Parallel Printer port
Configured as LPT1, LPT2, or LPT3
All ports can be disabled

Cable/Connectors: 37-pin commercial grade connector and support bracket mounts in chassis
"3-into-1" heavy duty cable with
37-pin connector
2 each DB25 (RS232C) connectors
1 each "Centronics" connector
Cable is jacketed and shielded

Manual: Illustrated 26 page manual in IBM PC owner's manual format

Warranty: One (1) full year on all parts and labor (second year extended warranty available)

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SpellStar™		$ 250	Call
3 Pak, Word & Mail & Spell, above 3		$ 845	Call
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Perfect Speller™		$ 189	$139
SELECT INFO Select (a WPS)		$ 595	$339
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UTILITY

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NORELL DATA, System Backup		$ 50	$ 39
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All Microlazers are expandable (w/copy to 512K) (Snap-on to 64K)			
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Other interfaces, OmniNet, Constellation, Mirror. All in Stock

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ISM, MatheMagic		$ 100	$
MICROCRAFT Legal Billing & Time Keeping		$ 750	$3
Prof Billing & Time Keeping — Billkeeper		$ 750	$3
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MailMerge™		$ 250	$1
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3 Pak, Word & Mail & Spell, 3 above		$ 845	C
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ReportStar	NEW!	$ 350	$2
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Note: Color II and III come with cable for IBM PC		

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MICROCOM, Micro Courier for Apple II	$ 250	$1
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Stock Smartmodem (RS 232)	$ 199	$1
Smartmodem 1200 (RS 232)	$ 699	$5
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SIGNALMAN, Modem MKII (RS 232)	$ 99	$
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9x9 Dot Matrix, 100cps, 2.3K Gemini 15"	$ 649	$4
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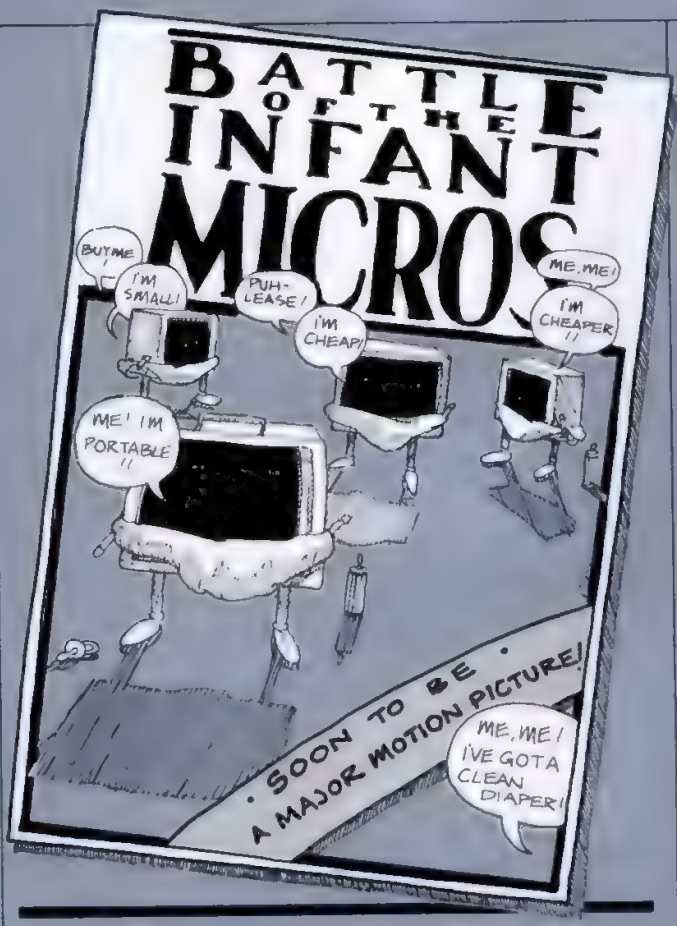
omething Old, omething New, omething orrowed, omething Big nd Blue

e marriage between IBM and lel (IBM recently acquired a 12- ocent interest in Intel) appears oe off to a peachy start. Intel, hich supplies the microproces- for the Personal Computer, : developed a course to teach X°X 86/88 architecture to those M employees involved with PC. Through a series of lec- es and laboratory exercises, · employees will learn the in- uction set of the 8086 and 88 processors, enabling them qprogram the PC.

The course will not train em- yoyees to develop applications ftware for the PC. This under- nores the fact that the PC is not elevelopment system. Writing in eeleads (an Intel publication), a lokesman for the company iiinted to this development as mother example of the rapport ezel is building with IBM. So far, e response within IBM for the uurse has been tremendous," he bid.

°C Faire Tyme!

ne first IBM PC Faire will be leld in San Francisco's Civic Au- ıtorium and Brooks Hall, Au- ust 26-28. Faire Chairman Jim s'arren, a veteran organizer of ie West Coast Computer Faires, planning 550 exhibit spaces. he Faire hopes to attract repre- ntatives from the business and ducational communities, as well s computer enthusiasts. For nore information, call (415) 851- 0077.



Battle of the Infant Micros

Competition in the under $100 computer market is about to rev up a couple turns. Texas Instruments plans to ship its 16-bit Model 99/2 in June, just in time to face the Timex ZX-Spectrum, an 8-bit machine with a Z-80 processor and a color display option (which, at $149, will sell for $50 more than the black and white model).

The two micro behemoths have faced each other once before in a struggle for dominance of the digital watch market. Texas Instruments was handicapped by its dependence on outside manufacturers for digital display parts. Timex won handily.

In the battle to come, the tables are reversed. Timex will purchase certain components from third-party vendors. However, the giant watchmaker boasts a wider distribution network. Both companies are expected to throw everything they've got into the race, which is to say, millions for advertising. Meanwhile, Digital Research of Pacific Grove is reportedly working with Mattel, Inc. to install CP/M on a $200 computer.

Of course, the race may get more crowded. Should IBM decide to introduce a Peewee PC, the toddler could make up for a late start with a firm push from its colossal parent.

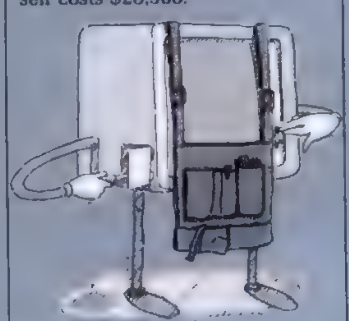
The Wild Bunch

The frenzied lateral mobility of computer programmers and systems designers shows no signs of abating. Employees of one company often walk across the street to the competition, lured by sweeter perks, better salaries, a more pleasing view, or whim. In January, a hardy band of 17 Intel engineers walked from that company's Portland office to kick off a highly secret venture temporarily (and pointedly) called "Sequel, Inc." Most of the engineers boast extensive Unix experience.

Rumors, of course, abound about their project. Perhaps a diskless, Unix-based system that uses between one and three 16032 or 32032 National Semiconductor chips with voice exchange capabilities tying to cable? Sequel won't say.

Robot the Riveter

Did you know that the Japanese-built IBM 7535 robot assists in the assembly of PCs at Boca Raton? The 7535 is a jointed mechanical arm that can move in four directions. It can be programmed in AML (a manufacturing language) by the PC. Interested? The PC configuration used to program 7535 (plus the software) costs $5,575. The automaton itself costs $28,500.



Illustrations: Stuart Bradford

PC-Communiques



Hey, You! Buy This.

We hear so much about Japan's worldwide domination, or near domination, of automobile, audio/radio, and photography markets that we've neglected to notice giant strides in other areas. Land-poor Japan, for example, is a leader in development of aquaculture—or fish farming, though "fish" can refer to edible algae (seaweed), crustaceans, and other marine comestibles.

The Japanese have also invented a way to freeze-dry whiskey, which may or may not be good news. But there are two other products we can certainly live without. One, an automatic "bow meter," appears to pose no threat to the domestic tranquility. The device is used in large Tokyo department stores to train employees to achieve the appropriate degree of obeisance to shoppers, depending on their status—which is, of course, measured by the size of their accounts at the department store.

The other development, we're sorry to report, may have potential in the U.S. The Japanese are combining speech synthesizing and photoelectric technology with . . . vending machines. When someone walks by a vending machine so-equipped, he trips an invisible beam and loosens the insistent tongue of the mechanical merchant. "Buy a Coke!" it may demand, or "Refresh yourself with a whiskey popsicle." With Japan's impressive expertise in robotics, we're afraid to guess where all this may lead—perhaps a talking vending machine that bows if you buy a coke and chases you if you don't.

All Roads Lead to Cupertino?

Regional Silicon Valleys are cropping up all over the country, indeed, throughout the world. King Hussein of Jordan aims to make his country the computer mecca of Araby. The Republic of Ireland, as part of its intense effort to industrialize, is wooing foreign manufacturers with favorable loan terms and export assistance. Multi-nationals are lured to Singapore by that strategically situated city-state's tradition of unabashed capitalism, political stability, and a cheap, willing work force. India boasts a well-trained bank of programmers, many of whom work for the subcontinent's largest computer firm, Hindustan Computers.

Except for Japan, many countries promoting domestic computer-related industries face an old problem: the brain drain. The fact



is, many foreign programmers and other computer wizards do not resist the wicked lure of the West, especially the U.S. Many American companies actively recruit abroad—and with enough success to agitate at least the nor foreign competition. The major foreign competition (guess who?) is another story.

Listen Up, Bug Tussle, Oklahoma!

You too, Rabbit Hash, Georgia; Rough and Ready, California; and all points in between. We've received many inquiries from readers complaining that their nearest PC Users Group is too far away for them to participate. Apparently, CompuServe is also aware of the problem. The Columbus, Ohio-based computer network now boasts the first electronic IBM PC Users Group.

The 350-member association is divided into sections for user updates, product reviews, programming, software libraries, and on-line conferences. It plans to hold regular nationwide on-line meetings, which are open to anyone with PC communications capability and access to CompuServe. For more information, contact Mike Todd at (202) 561-5187.

"YES, HE is a modernist in the sense of a computer, in the sense of precision of word and gesture,"

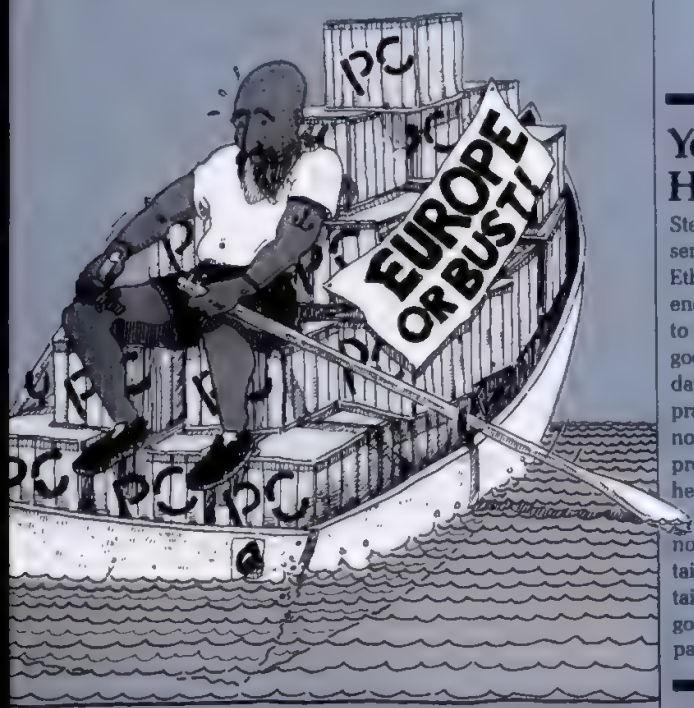
French Foreign Min
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Soviet premier, Yuri V. And

The Art of IBM

Madrid, it's the Prado. Paris has the Louvre; Leningrad, the Heritage; London, The National Gallery; and New York, the IBM.

The IBM? Something amiss here, or at least the cultural czars of New York fear so. Seems IBM, which owns a number of paintings and other *objets d'art*, is planning to open a public museum at its new corporate headquarters in Manhattan. Officials from the city's leading museums worry that Big Blue's new interest in exhibits will affect its heretofore generous corporate support of public arts institutions.

Not to worry, says IBM. The headquarters gallery will emphasize traveling scientific and technological exhibits rather than Picassos, Pollacks, and Peruzzis.



A Mark, a Franc, a Buck, or a Yen

A spokesman for Dataquest, a market research firm in California, spoke recently at an industry seminar in Silverado, California. He predicted that by 1987, fully one half of the PCs manufactured will be sold overseas. At the rate things are going, we wouldn't be surprised. For more on the PC abroad, see "Parlez-Vous PC?" and "Tie Me IBM Down, Boys" in this issue.



You Can't Go Home Again

Steve Wozniak, speaking at a seminar on "Computer Industry Ethics" at the CP/M-83 Conference in San Francisco, admitted to a pervasive nostalgia for the good old, pre-lawsuit, homebrew days when humor was looser and pranksterism abounded. "Woz" noted that he was perhaps "most proud of" a Dial-A-Joke machine he invented early in his career. He also fondly recalled his announcement of the bogus "Zoltair" (to compete against the Altair, presumably). Those days are gone forever, he lamented to the packed audience.

Supply and Demand

When IBM began selling PCs in October 1981, it was not able to authorize as many dealerships as it would have liked, due to a limited supply of Personal Computers. As of January this year, there were 650 authorized dealers, but a backlog of requests for franchises still exists.

In evaluating a potential dealer, IBM takes a close look at the appearance of the retailer's outlet. Big Blue also considers location, professional standing, track record, business volume, and warranty/service follow-up. Corporate visitors "drop in" once a month to discuss product forecasts, review business plans, and generally take a good look around the shop.

So, What Else is New?

Soon after introducing the PC, IBM was widely criticized for promoting a product that lacked requisite software support. Big Blue typically refused to comment. It was clear, however, that IBM's strategy was to let the marketplace respond. This gamble seems to be paying off, which is good for both the PC user and IBM (although the PC is reportedly not yet profitable, which is neither surprising nor alarming at this still early date). Established manufacturers, individual programmers, and to an extent, even IBM itself, are constantly introducing new programs and peripherals for the PC.

In fact, so many products are coming down the chute, it's very difficult to sort them out. Now, there is a 24-hour bulletin board service to help keep users informed. Dubbed the "PC Information Network," it offers hardware and software reviews, public domain programs, and other information. Contact James Locker (616) 327-8228 or 329-1000.

PC-Communiques

All The Rage

General Motors did it. Boeing's reportedly considering it. Why not Big Blue? IBM has already begun discussions with giant Matsushita Electric Company of Japan about the possibility of a joint venture to develop and manufacture such low-cost products as terminals, office automation systems, and small business computers.

The joint venture talks underscore IBM's readiness to sell third-party products under the IBM logo. IBM already markets a robot system built by the Sanyo Seiko Manufacturing Company, and copy machines produced by Minolta. An industry spokesman calls the latest move, "a bellwether of things to come." Question is, who's courting whom?

Computerized Indexes

Students, librarians, novelists, researchers, teachers, editors, writers, and other careful readers take note: Peter Norton, while preparing his book, *Inside The IBM Personal Computer*, wrote a series of DOS-based programs for generating book indexes.

While reading a reference book such as *Abalone to Zucchini, A Layman's Guide to California Agriculture*, for example, you could enter every mention of kale, kohlrabi, and cabbage as you proceed. The program will sort the references and display each one with the appropriate page numbers.

The program, of course, works equally well with fiction, anthologies, biography, and text books. If you could use Norton's computer indexer, send a formatted disk and a self-addressed, stamped envelope to Norton Utilities, 2210 Wilshire Blvd. #186, Santa Monica, CA 90403. To assure safe delivery, use a well-padded, static-resistant envelope. Happy Indexing.

Overheard at the Queen's Banquet

Herb Caen, oracle of the San Francisco Bay Area, patron saint of three-dot journalism, gossip extraordinaire (though he may bristle at this moniker), popularizer of that desperate journalist's plaint, "Item, item, who's got an item?"—and daily (except Saturday) columnist for the *San Francisco Chronicle*, provided an IBM angle to Queen Elizabeth's recent visit to soggy California.

In his column of March 9, Caen wrote, "At that now historic State Dinner, J. Gary Shansby, chairman and CEO of mighty Shaklee Corp., found himself seated at a table that included Steven P. Jobs, brash 27-year-old chairman of Apple Computers. 'What business are you in?' Jobs asked him, and when Gary replied, 'Vitamins,' Steve continued, 'What's the name of your company?'

'Shaklee,' said Shansby, at which Steve nodded.

'I've heard of you,' he said grandly.

'You should have,' grinned Shansby, 'we just bought 50,000 IBM Personal Computers!' . . . (Jobs has been on the phone ever since trying to reach Shansby to talk business.)"



Herb said it all. Or Jobs did. No, the prize goes to Shansby. In any case, thanks for the item, Herb.

Pick of the Litter

The Society for the Prevention of Cruelty to Users (SPCU), a nonprofit organization created to evaluate IBM PC software, has announced publication of *User Hotline: The Softbook of IBM Personal/Home Computing*.

Founded by a psychologist, the SPCU tests new programs and describes them in step-by-step, nontechnical language. The book, available this fall, emphasizes information management for families and self-employed people. For more information, contact SPCU at 6716B E. Cedar Avenue, Denver, CO 80224, (303) 388-2380.

Health Insuran Isn't Enough

We've received further eviden that employee benefit package aren't what they used to be. H riet and Henderson Yarns, Inc. Henderson, North Carolina (m to: "Finer Yarns For Finer Fab rics") is spinning the IBM PC into the skein of standard com ny employee offerings. Harriet and Henderson already relies an IBM System/38 and three S ries/1 computers to help sched work at the mills, control orde and provide price and supply formation to its cotton buyers.

In order to foster better und standing of various computer-r lated jobs in the company and promote computer literacy am the staff, the company offers I PCs to its 1500 employees at d count. To bolster the offer, it h established a three-week comp er course at nearby Vance Gra ville Community College. Ac cording to vice president of fi nance Phife Ross, "This progra will give us more value than a other brand of education we of people here. We're committed involve the computer user in t system."

PC-Communiques Pays

Do you have news, gossip, or unusual computer tales for *PC-Communiques*? We will pay up to $50 for each submission used. You must include your name, address, and telephone number with the item. We will preserve you anonymity if you wish. All submissions become the property of *PC* and are subject to editing. Our *User-to-User* section also publishes and pays for readers' submissions; that section features tips, problem solutions, and short programs or routines. Please send submissions to the appropriate department—*PC-Communiques* or *User-to-User*—at PC, One Park Ave., New York, NY 10016.

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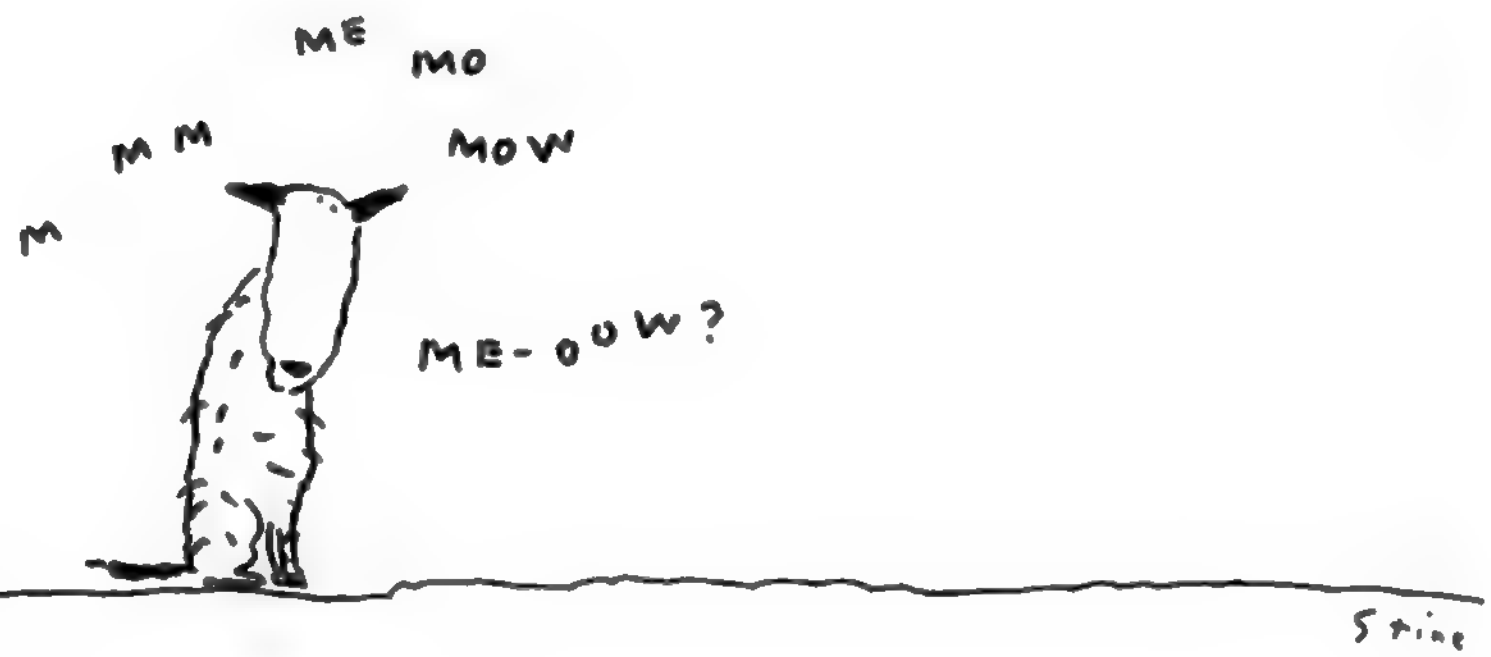
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General Business	7,143
Programming Tools	5,332
Education	1,302
Vertical Industry Packages	2,164
Home Use	514
Other	4,226
TOTAL	21,042

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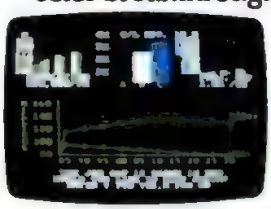
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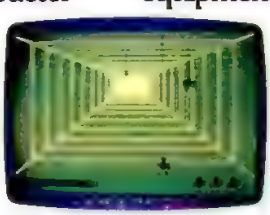
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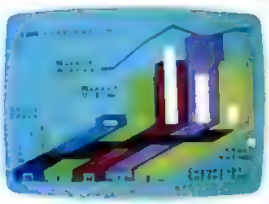
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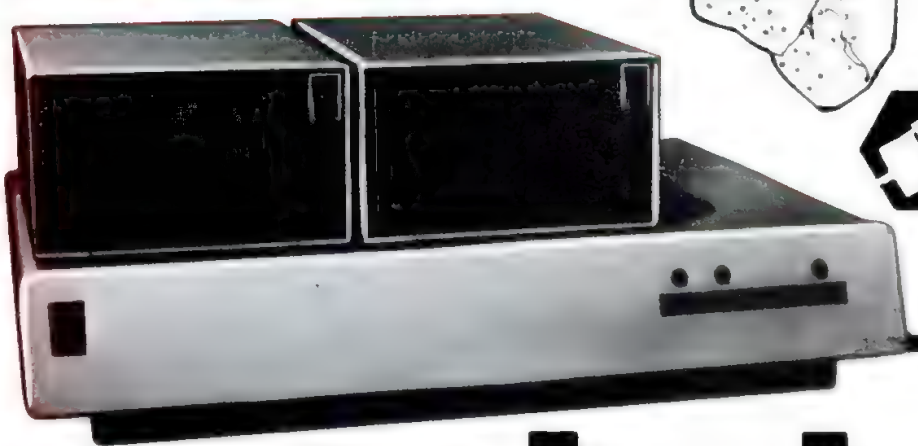


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estions about PC-DOS, its hidden files, error messages, d copying commands. Learn about using multiple monitors, AM-disks, and tricky subscripts from the PC Tutor.

Delving Into DOS



nerasing Files

sometimes erase a file by mistake. Is e any easy way to get the file back?

Valerie Endes
Florence, Alabama

Unlike CP/M-80, with PC-DOS you not retrieve a file after it has been ed. The reason for this is that DOS ntains a list of which sectors on the go with each file. When you erase a all of its sectors are set to an unused us. This is a permanent change and e is no way to alter it.

The advantage to a scheme like this is it lets space be used efficiently, while mitting a very large file to be easily d in random access mode.

ck to the Monitor

I would like to be able to display a oh on the color graphics display pter and then switch back to the nochrome display without interrupt- the text already on the monochrome play. Is there an easy way to do this?

Jules Carroll
Beaverton, Oregon

t is not easy, but it can be done via the owing BASIC program (see Figure 1). f you don't mind disturbing the nochrome display, there are easier proaches. This program will read all of information pertaining to the mono- ome display, switch to the color dis- y, and when that display is finished, it ets all of the monochrome informa- n.

CHKDSK Error Messages

Q: What does the error message "files cross-linked" mean? It appears when I run CHKDSK. Does this mean that the disk is unusable?

Phelps Gates
Chapel Hill, North Carolina

A: *The CHKDSK program is a workhorse that does much more than finding out how much disk space is available. It also checks over all of the PC-DOS file-allocation information. The "files cross-linked" error message means that CHKDSK found an internal inconsistency on your disk.*

CHKDSK will rectify the mistake, if possible. If you run CHKDSK again and it no longer prints that error message, then the disk has been cleaned up as much as possible. Most likely two of the files will no longer be accessible, but the rest of the disk may be usable.

CHKDSK can report a number of messages. The message "nnn Bytes freed," for example, is not about an error at all. It appears after you interrupt a program that was writing a file to disk. Some space had been allocated for the file, but the directory entry was never written. When that happens, CHKDSK deallocates the storage, and you can use those sectors again. Some programs also will cause this message to appear if they erase a file incorrectly.

Another message, the one you saw, is the "files cross-linked" message. That is an error, and means that somehow two files were found to have sectors in common. This error may be caused by insert-

Figure 1: Method for rapid switching between color and monochrome screens.

```
10 REM enable color adapter, then return to monochrome
20 DEF SEG = &H40 : DIM A%(30)  REM setup
30 POKE &H10,&HCF and PEEK(&H10)  REM enable color
40 REM now read all of the old video information
50 FOR I=0 to 29 : A%(I) = PEEK(I+73) : NEXT I
60 SCREEN 1  REM use the color/graphics display
70 REM do any color/graphics you wish here
80 REM now put everything back as before
90 POKE &H10, &H30 or PEEK(&H10)
100 FOR I=0 to 29 : POKE (I+73),A%(i) : NEXT I
110 REM now back in monochrome mode
```

ing a disk in a drive while a program is writing to a file. When PC-DOS updates the directory entry, it may not check for such a mistake, and so the disk-allocation mechanism gets scrambled. A common way that this occurs is that you put in the wrong disk, find that it is write protected (whew!), and afterwards insert the correct disk.

The other error message I have seen when running CHKDSK is "file allocation size error." This message means that the value in the file entry for the size of the file does not agree with the number of sectors that actually belong to that file. The causes of this error are similar to those that result in the "cross-linked" error, and the end results are similar. In this case, some of the information in a file may get lost, though the rest of the files may be OK.

Letters High and Low

Q: I do a lot of technical typing on my PC. Is there any way to generate superscripts and subscripts by using the graphics card? Can these symbols be printed?

Jeff Cochran
Kansas City, Missouri

A: In order to print superscripts or subscripts you need to purchase a program that can take advantage of the abilities of a given printer. The Epson or IBM PC printers do have subscript/superscript capabilities, but most programs fail to take advantage of them.

Getting superscripts or subscripts to appear on a display is a more difficult matter. I can show you a BASIC routine that will do this, but I know of no programs currently available with this capability. My method takes advantage of a glitch in PC-DOS. When PC-DOS calculates where to locate a character, it reads information from memory to find the number of characters per line. You can mislead it by putting incorrect information into that memory location to make it display a super- or subscript when using the color/graphics card in a graphics mode (either SCREEN 1 or 2). The pointer for characters-per-line is at location 0040:004A hex. See Figure 2 for a BASIC program that will show what it can do.

Try this program out to get a feel for how changes in location 0040:004A will affect DOS. This will certainly cause strange scrolling, so it is best to reset the value to the right number immediately afterwards, as is done in line 90.

Duplicate Commands?

Q: What is the difference between DISKCOPY and COPY? Is there any advantage to using one over the other?

Francis O'Brian
Scranton, Pennsylvania

A: The two programs are very different and so are their effects. DISKCOPY takes a disk and makes an identical, bit-for-bit copy of it. DISKCOPY will also format the target disk if necessary. Also, a related program, called DISKCOMP, will report that the two disks are the same, if no changes have been made to the target.

COPY, on the other hand, is a program that reads one file at a time and then writes it to the target disk. If the target disk is not already formatted, you will see a read error message with the usual "Abort, retry, or ignore" instruction. If the target disk already has some files on it, then at some point the target might fill; when this happens, COPY will stop running.

Because of the way the file-allocation mechanism works, a copy made by using the command COPY *.* B: wi
space for each file allocated seque
rather than randomly. After a d
been used repeatedly, the files a
fragmented. To access one file
require reading a number of d
tracks located all over the disk

DOS maintains a list o which sectors on t disk go with each

COPY to make a new copy of the d
eliminate fragmentation on the ne
Refer to the file allocation appe
IBM's DOS manual for more infor
on how this procedure works.

Hidden Files

Q: In Volume 1, Number 7 of
responded to a question regardin
COPY and the change it makes in
formatting configuration: whe
DISKCOPY a single-sided diske
copy is always in single-sided for
order to use the additional 160K av
in the double-sided format, I us
command COPY *.* B: to copy fro
gle-sided disk to a double-sided
When I ran CHKDSK afterward
report told me that two hidden
files were not copied. I know tha
are programs for sale that can u
hidden files, but is there a way t
pletely transfer a single-sided form
onto a double-sided format disk w
having to go to that expense?

John L. E
Mt. Prospect,

A: You can not use COPY to copy
files unless you reveal them first.
den file is a file that is completely
so it is inaccessible from PC-DOS
mands, including COPY. If you
bought a program that actually co
hidden files, then COPY will not
However, if you just want to put t
DOS system, including its two
files, on a double-sided disk, the
ways to do that.

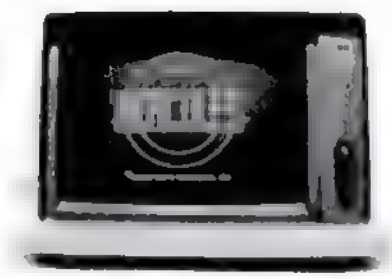
Figure 2: Short program for inserting a subscripted character on screen.

```
10 REM write a subscripted A on the first line
20 DEF SEG = &H40
30 SCREEN 2     REM actually 80 columns
40 CLS
50 PRINT "TRY This";
60 POKE &H4A,40    REM pretend 40 columns
70 LOCATE 2,4      REM to the right of the "Y"
80 PRINT "A";      REM prints as a subscript
90 POKE &H4A,80    REM reset to 80 columns
```

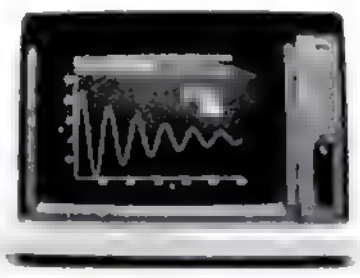
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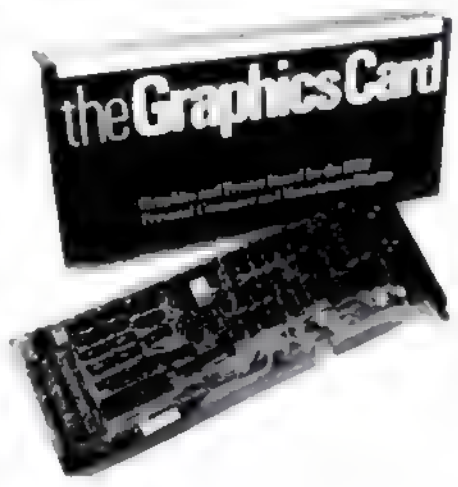
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The simplest way is to format the disk with the system option, using the command A>FORMAT B:/S which will format the disk in drive B and then copy PC-DOS onto that disk. Once this has completed you can then put the disk you wish to copy into drive A, and type A>COPY *.* B: which will copy all of the disk's unhidden files. The two hidden files that come with PC-DOS were already transferred to the new disk by the FORMAT program. When you run CHKDSK on the new disk, it will show these two hidden files, as you desired.

Smoking Displays

Q: I have two questions that I would like answered. First, I attempted to follow instructions given by a reader in PC-Communiques (PC Volume 1, Number 3) about connecting the IBM color/graphics card to the IBM monochrome display. Much to my dismay, smoke started coming from the display, which had to be repaired. Dare I try again?

The second question should be safer. Can you recommend a color television to use with the color/graphics card?

Sol Taskin
Redding, California

A: First, under no circumstances should you attempt to hook the monochrome display adapter up to the color card. Those published instructions were incorrect. Although you could use the two boards in this manner, PC-DOS will not understand what has happened. The net result is that sync signals will be set up to drive a color display. As I explained in an earlier column, color displays are significantly different from IBM's monochrome display.

By using this method you have taken a display with an 18 kHz scan rate and tried to use it at 15.75 kHz. Most displays put the sync signal through a special transformer to get the very high voltages needed to drive the CRT tube. The net result is that the incorrect sync frequency will cause the monochrome display to be fed the wrong high voltage—hence a smoking display!

Although both cards use a 6845 chip, and software can be written that allows a monochrome adapter to work—sort of—with the color display, you should not attempt to repeat this experiment. Even if it were safe, the results would be useless, as the characters on the display would be unreadable.

As to picking a color television . . . A number of manufacturers are coming out with color televisions that can be used as monitors with composite input capabilities. If you want RGB capabilities, then the only suitable television I know of is the Sony Profeel. To use the Profeel you will need to change sync polarity.

I am not convinced that the Profeel is worthwhile as a graphics display since it is rated at less than 640 dots across its screen. You can, however, get a high-resolution color monitor, and then attach an add-on television tuner with RGB outputs. The cost of the tuner, however, will probably exceed the cost of a high-quality television set.

MUCH TO my dismay, smoke started coming from the display.

Controlling Keys

Q: I recently wrote a word processing program in BASIC and have run into a minor snag or two. My program uses the key trapping features of the cursor control keys to position the cursor onto the place where corrections are necessary. This works fairly well. However, I would like to control the Num Lock and Caps Lock keys with my software. Could you describe the internal functions of these keys and the address, if any, that I can POKE to control them?

Steven C. Lupton
San Diego, California

A: Both the Caps Lock and the Num Lock keys cause similar reactions in PC-DOS. After you push one, a flag gets set in memory to indicate that the status of the system has changed. If you own a Technical Reference Manual, check the listing for the data byte KB_FLAG. The bits of interest are bit 7 for the Caps Lock State, and bit 6 for the Num Lock State (bits are numbered from 1 to 8). Thus, if you want Caps Lock to be off, just set a 0 in bit 7. In BASIC, the code would look like:

```
10 REM turn Caps Lock off
20 DEF SEG = 64  REM DOS data a
30 POKE 23, &hBF and PEEK (23)
   turn off bit 6
```

THERE ARE many scientists and engineers who would like to use scientific word processing.

If you want to turn off the Num Lo just use &hDF instead of &hBF in line To turn Caps Lock on, you would &h40 or PEEK (23).

Scientific Symbols

Q: A number of manufacturers have w processors that can display and print Greek alphabet and associated mathem ical equations. Has a dedicated scienti math word processor been developed the IBM PC? While this is admittedl special application, there are many sci tists and engineers who own PCs a would like to use them for scientific w processing.

John P. Bo
Ann Arbor, Michig

A: Although I agree that such a progr is needed, there is not, at present, a sa factory scientific editor for the PC. I presently writing one for myself. Unfor nately, it requires about $4,000 of ex hardware to generate the necessary perscripting, subscripting, and spec fonts.

A much cheaper approach is to mo fy the character ROM that was suppl by IBM. You can buy a new ROM, Motorola MC68764, for about $40 inclu ing programming. The only editor I kn of, however, that can display these ad tional characters on the PC is EDIX. using EDIX with WORDIX (the progra formatter half) you'll have a "what y see is what you get" editor that uses t 256 characters available on the ROM. few characters are unattainable due PC-DOS's use of those characters for o er purposes, such as line feed.

t RAM-disks Work

would appreciate further details on things you mentioned in *PC Tutor* Volume 1, Number 8). First, how do make use of 576K in the PC for RAM-s? Also, is there any way to patch dStar to make it seek its subroutines RAM-disk or a drive other than drive

Jeffrey Speiser
San Diego, California

he way I use a RAM-disk is by per-iently allocating that memory space e a RAM-disk by means of switches de the PC. Although some RAM-disk grams allocate storage when they are I write so many assembly language grams that die and require a reset that handy to make sure that PC-DOS nev-nvades my RAM-disk. As a result, ough my PC has 576K, it never uses e than 256K for a program. The ches inside the PC are set to inform DOS that my machine has 256K.

As for patching WordStar (WS) to use AM-disk: if you run WS from a drive, it consistently search for subroutines

CHKDSK does much more than finding out how much disk space is available.

hat drive. To accommodate it, do the owing:

A>COPY WS.* C: (this copies all WS gram files to the RAM-disk).*

A>C: (move to RAM-disk as de-lt).

C>WS file: (for whatever file I edit).

Note this bug: if you log in a new disk ch as B) with WS, it will begin using A drive for the program files. /PC

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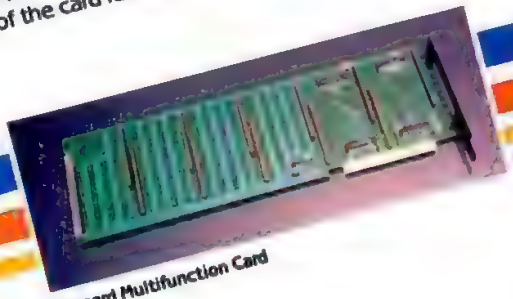
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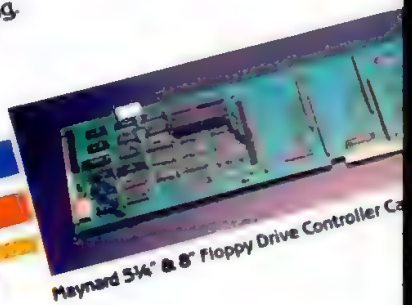
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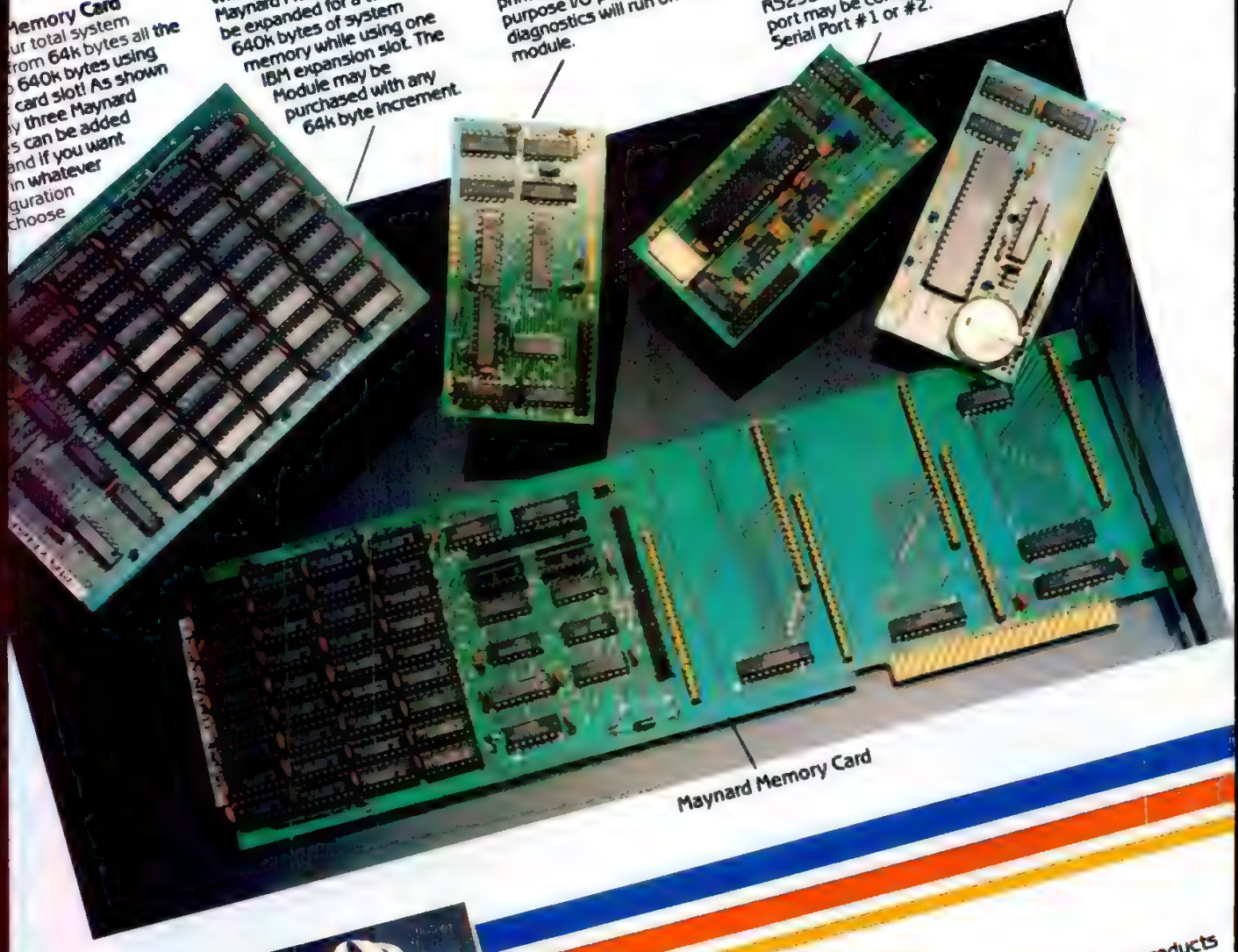
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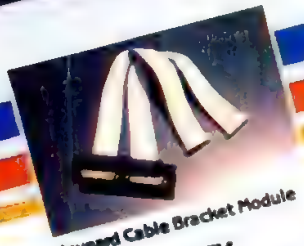
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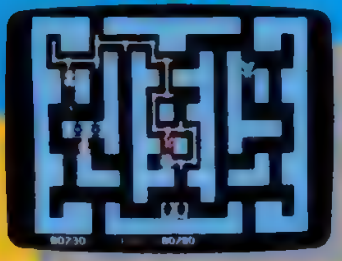
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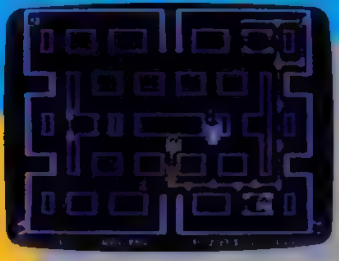
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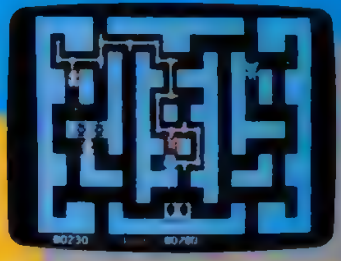
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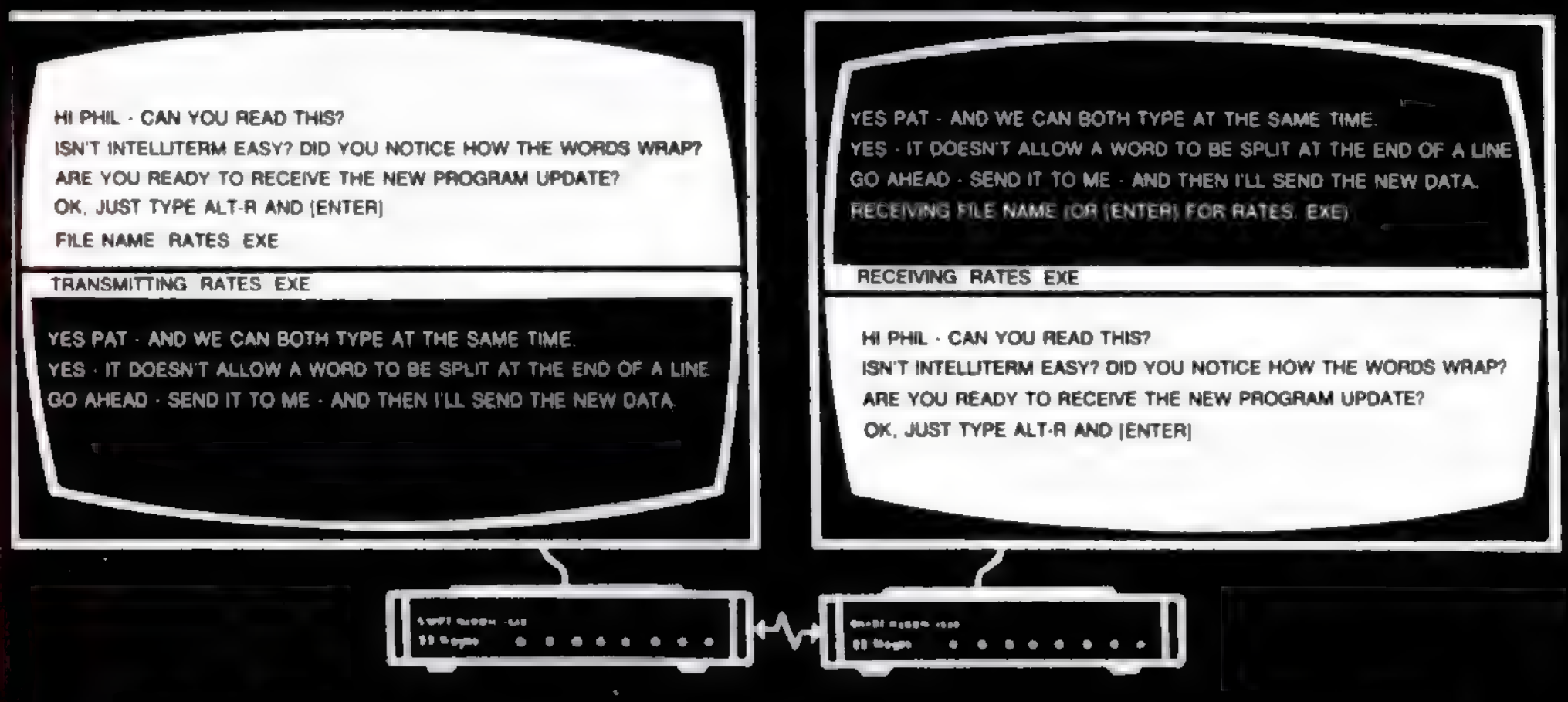
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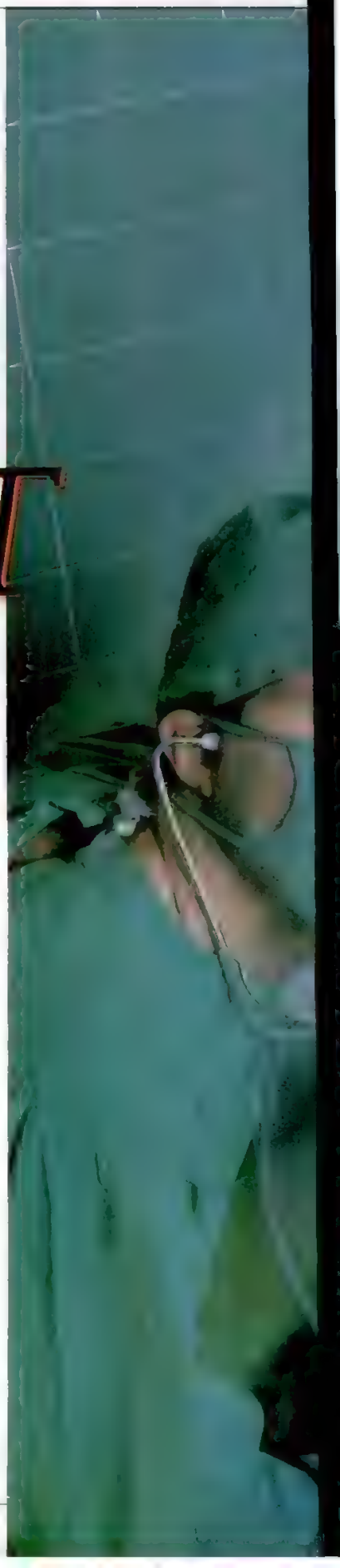
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COVER STORY/WINN ROSCH

Ben Franklin was right, even if he did get the wording wrong: A byte of prevention is worth 128K of RAM.

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No matter that it costs only a few grand, having a computer with that unique three-letter marque—IBM—imbues the owner with a special sense of pride. A natural outcome of this emotion is a desire to lavish special care on the machine, doing whatever you can to keep it looking show-off new and running its best as it ages.

Sage Advice from the Creator

At first blush, it might seem that regular maintenance and care are unnecessary, that pragmatic PC owners need not lift a finger to keep their computers running well for years.

The cornerstone of the IBM PC design philosophy was to build as reliable and worry-free a computer as possible. Explained IBM spokesman Dan Scherer, "We tried to design a machine that required a minimum of preventative maintenance." Asked to give the factory's best advice on taking care of the machine, he responded, "Just use the common sense that God gave you."

Scherer cautions that a personal computer, though a business tool, is also a precision instrument. Although the IBM PC is rugged and relatively tolerant of its surroundings, it does have limitations.

"Be reasonable," he said. "Don't plan on using your computer on the steel mill floor." According to Scherer, the best preventative measure is to avoid placing the PC in a hostile environment. In general, the PC will perform best at the same temperature and humidity comfortable for its human operator.

The computer should be given the same considerations as important bookkeeping records. Just as a spilled cup of coffee would be disastrous to a paper ledger, the PC keyboard would likely succumb to such a drenching. In other words, keep overbrimming beverages away unless the equipment is covered by flood insurance.

Floppy disks for the PC (or any other computer) require a bit more care than their paper counterparts. The following procedures are recomended.

- Keep disks away from magnets such as those created by hi-fi speakers, power transformers, and electric motors. Magnetic fields from such devices can alter or erase irreplaceable stored data.
- Take care to always keep the disks inside their protective sleeves, not in the disk drives.
- When readying a floppy disk to be inserted into a drive, guard against touching where its magnetic surface shows through the slots in its case. The tiny bit of oil in a fingerprint can be enough to gum up the works of a disk drive.
- Not only are cigarettes harmful to the health of smokers, but they can have

Photograph Jack Resnick.

deleterious effects on computers, too. Ashes have a devious way of finding high-precision parts (which include disk drives and even the disks themselves) to collect on. A speck of ash or even a single particle of tar from a cloud of cigarette smoke is enough to foul some disk units.

- Store floppies in protective sleeves or even an anticontaminant case.
- Avoid static electricity. Should you mail disks loaded with data, be sure to use anti-static mailers. Also consider using anti-static sprays for dry days and an anti-static mat in the computer location. (See "Out, Damned Spark" in this issue.)
- To avoid computer damage from electric power problems—short voltage surges on the line that can zap your computer's innards—you should always use a voltage surge protector to clip the transients before they can enter your machine. (See "Block That Bolt" in this issue.)

To reassure its owner that a trip to the shop is unnecessary, the PC is designed to make internal checks on its own. Every time the power switch is turned on, it runs through diagnostics just to make sure all of its circuitry is alive and well. A happy chirp a few seconds later is a reassurance that all systems are go.

Any electronic aberration is automatically flagged so that important documents or data are not trusted to an untrustworthy machine.

Should there actually be a problem, the IBM instruction materials contain a section called "Problem Determination Procedures" to help each computer owner troubleshoot the system. The publication includes a "Diagnostic Aid Disk" that will help locate problems in any part of the entire PC system. For those involved troubleshooting, the factory recommends that PC owners consult their dealers for maintenance and service.

DO NOT USE cotton swabs! Strands of cotton fiber can come off and cause drive problems.



ond IBM Recommendations

ometimes the official factory recom-dations relating to care of a product t seem inadequate; for instance, mobile oil-change intervals. The fac- may recommend oil changes at 2- intervals, but many car enthusiasts ce oil more often, hoping to extract life from an engine. After all, the ning often goes, the factory wants o wear out sooner so that it can sell ones.

milarly, the computer enthusiast wants to do just a little more to coax life from his system. But the micro-ronics in a computer are different; have no moving parts to wear out. drives and printers, which do have nal mechanical parts subject to wear, be considered later.)

ather than slowly grinding down, ern solid-state electronics generally atastrophically. After marginal com-nts have been weeded out, however, failures are rare unless caused by nal events.

Weeding out" of marginal compo- typically occurs during the first few

RATHER THAN slowly grinding down, modern solid-state electronics generally fail catastrophically.

s of operation. Thereafter, barring an ide cataclysm—flood, lightning, or ear disaster—a computer's electron- generally operate satisfactorily for s without a hitch.

f new PC owners get past the first 24 s, they're home free," reassured rer. In fact, every PC undergoes a 4 burn-in at the IBM factory in Boca n, Florida, to cull the demons before owners hook them up.

or those who want an added margin afety over the factory's precautions, aps the best strategy upon becoming wner of a brand new PC is to pull the ling computer from its box, turn it on, and leave it on for a whole day.

Rather than trusting irreplaceable data to an as yet unproved machine, you can use the added burn-in time to familiarize yourself with the PC.

Once you are satisfied that the computer operates well, you can take extra steps to assure that your PC is in perfect shape—and, in doing so, perhaps give the machine and allied equipment a more trouble-free life.

DISK DRIVE HEADS GIVE no hint that they are encumbered by dirt until they actually misread or miswrite data.

Keep It Clean

Dirt, and particularly dust, is a major adversary to any computer system's longevity. Not only is dust unsightly, a build-up can trap elements that are difficult to remove from plastic equipment cases and impair the clarity of a video screen. Moreover, dust can also damage the computer's mechanical parts. A PC so layered with dust that it looks like a prop left over from *The Raiders of the Lost Ark* is inviting disk drive and printer problems.

Fortunately, such problems can usually be dealt with quickly and painlessly with the gentle application of a vacuum cleaner. Use the finest nozzle available to draw dirt from inside the disk drives, from between the keyboard keys, and from within the printer.

The dust that inevitably collects on the monitor or CRT screen can be removed with a soft cloth and ordinary window cleaner, in the same way that a television screen might be cleaned off. The PC user who wants to be particularly careful may prefer to use a special CRT cleaner, but in the end the results will be similar. The same window cleaner is perfect for removing smudges and grime from all the computer and printer cases.

For tougher dirt on the printer or monitor, almost any household cleaner may be used—the tough plastic surfaces are immune to most everyday solvents. However, while the paint finish on the metal cases of the keyboard and PC itself is also tough, it might be damaged under the application of some of the more powerful cleaning solvents. So be wary. If in doubt, dampen a cotton swab with the questionable-quality cleaning fluid and try the results on the back or bottom of the cabinets (so that if the solvent is too powerful, the tiny test damage can be hidden).

Use care when spraying any fluid on the PC. Do not allow any to drift into the disk drive slots or the slots covering the speaker.

A dusty keyboard is generally vacuumed, though you may prefer to use a small can of compressed air equipped with a long narrow nozzle, available from any art supply store.

Rather than spraying to remove smudges from the case or keys, dampen a soft cloth with window cleaner and gently wipe everything off. (Damp means, by the way, that nothing drips from the cloth when it is wrung out.)

Those who do not favor surprise jigsaw puzzles should not attempt to disassemble the keyboard to clean it. Taking it apart is like opening a jar of grasshoppers; springs and parts are apt to fly off into hundreds of different directions.

Generally, a PC is better off when it is protected from the dirt and dust around it. Not only will this keep it looking like new, but it will also help prevent potential mechanical problems.

The best protection against dust is a dust cover. (An electronic precipitator will help matters too, naturally.)

Because the IBM PC has proven itself to be so popular, several types of dust covers are available commercially, either

from dealers or by mail-order. Or one can be made by the clever-of-hand with a yard of cloth and some elastic. Among various products, there is a choice between coveralls and individual covers for monitor, keyboards and computer.

The only precaution that needs to be taken with either prefabricated or homemade dust covers is to be certain that the covering material itself does not generate static electricity when it is furled or unfurled. The little sparks are not only painful to the fingertips, but are potentially damaging to stored data.

A HEAD-cleaning once every 10 to 50 hours of use should be often enough to prevent problems.

Should an all-inclusive dust cover be inconvenient—maybe it keeps knocking over that single-rose-in-a-bud vase next to the PC—the vulnerable disk drive slots alone can be protected with special covers specifically designed to lock out airborne pollutants. One such disk cover is offered by Microcomputer Accessories, Inc. (formerly Nat Hellman III, Inc.), 5951 Firestone Blvd., South Gate, California 90280. Injection-molded from ABS plastic with a textured leatherette-look surface to match the PC, it uses a closed-cell vinyl foam to safely seal drive slots from the outside world when they are not in use. One covers both drive slots on the PC chassis. At $8 postpaid it's a good protection investment. (A companion keyboard cover of rigid injection-molded smoked bronze plastic is available for $12.)

A cover over the whole computer protects against more than just dust. "One of the main reasons a cover is necessary is the possibility of water damage in offices protected by sprinkler systems," observed Lorin Groscup of GL Computer Service. Through Yuba River Interiors, Post Office Box 1307, Grass Valley, California 95945, Groscup's Company offers a complete system dust cover with a vinyl exterior and fabric interior for $34.95 (plus $4 shipping, per order) as well as a printer cover for $14.95. (Other PC covers are available through the computer supply catalog companies.)



A recently-introduced degausser for removing residual magnetism from all types of digital heads.



A multi-purpose routine maintenance kit for personal computers.

Peripheral Considerations

Although there is no standard recommended care for disk drives besides protection, their proper operation can be safeguarded by regular care.

Disk drives work like tape recorders in that they have "heads" that record and play back ("write" and "read") their nals. As with tape recorders, disk-d heads can get dirty and magnetized.

Disk drive heads give no hint that are encumbered by dirt until they ac ly misread or miswrite data. Obviou then, it's important to clean them regu ly to avoid data errors. Once every 1 50 hours of use should be often enou prevent problems, and can extend lifetimes of disks and the drives th selves.

With the proper tool, a head-cleaning , the chore is simple: The disk is pened with a special solvent, then for a few seconds in the drive unit. h products are available from many ces. 3M Corporation makes a head- ning kit that is available at many com- r dealers and computer supply mail- r catalog companies. Innovative puter Products, 18360 Oxnard St., ana, California 91356, offers head ning disk kits as well as a variety of r personal computer care products. ther system, called Verfin, is manu- ured by Zolman International, 600 tgomery, San Francisco, California. Alcohol can be substituted for the ning solvent. Ordinary rubbing alco- is a reasonable substitute. (A 90 per- solution is preferred, but 70 percent fficient.) High-proof vodka will do in nch.

Those who do not wish to deal with ents (except, perhaps, to drink the ka) may find "Datalife" head-cleaning s made by Verbatim (and available mail-order catalog computer supply panies) more to their liking. A pre- ed (pre-soaked) cleaning disk is pro- d in a sealed envelope. The dispos- disk is put into a reusable jacket and rted into the drive slot for a fast, easy safe clean-up.

The more adventuresome can go right he heart of the matter and clean the /write heads of their computer direct- y removing the metal cover from the chassis to reveal the drive mechanism. heads can then be cleaned—careful- as if they were audio or video ds.

A lint-free cloth (a "photography-type

HIGH-PROOF vodka will do in a pinch.

nois," available from most photo sup- stores) works well. Or dampen a video d-cleaning applicator with solvent scrub lightly across the heads. Do not cotton swabs! Strands of cotton fiber come off and cause drive problems.

Once inside the PC cabinet, it's a good idea to consider the disk-drive heads, too. The constant rubbing of the magnetic disk past the read/write head can cause the head to become magnetized.

Although the prevalence of the problem is subject to debate, a concerned user will want to regularly demagnetize his disk-drive heads because there are no symptoms until it's too late and data is lost. A new product, a computer-head demagnetizer, or degausser, is available from Nortronics, Inc., 8101 10th Ave. North, Minneapolis, Minnesota 55427 and through dealers as model CMPF-205 at a suggested price of $35.95.

Any good quality tape head demagnetizer will probably do a reasonable job. However, the pole piece, the rod-like extension of the degausser body, should be coated with a soft plastic compound to minimize the chance of damage to the disk-drive head. Using any degausser takes less than a minute and is a good adjunct to regular head cleaning.

The degausser is brought near (or lightly touching) the head and *only then* turned on, slowly removed from the proximity of the head—say, to about 3 feet away—and turned off. The key to successful demagnetization is to suddenly turn on and slowly reduce the alternating magnetic field of the degausser.

If you move your PC around from time to time, you should consider checking drive alignment occasionally. Should you own a portable PC version, and transport it a lot, a 6-month alignment check schedule would be worthwhile.

Jim E. Vavrick of the technical support department of Epsom America, Inc. (which makes the standard IBM PC dot-matrix printer) advises that little regular maintenance is necessary for the printer. "It's built with the same precise tolerances as a watch so there's no need for oil to cover up imperfections," he said. "Working on the printer should be approached with the same concern as working on your watch."

The only regular care he recommends is vacuuming out any dirt that builds up inside and replacing ribbons as necessary. He estimated that ribbon life extends to 15,000,000 characters. Rather than counting them, though, replace it when it doesn't print dark enough!

The print head itself should last for about 5,000,000 lines, or 47 days of continuous, full-speed operation.

The most common problem in using the printer is caused by labels. Many are designed to release after printing, or once they've rolled through the machine. They can come off, stick to the printer platen (roller) and jam the works. To avoid the problem, either don't use that kind of label or don't wind them backward through the printer.

A HAPPY CHIRP a few seconds after turn-on is assurance that all systems are go.

When the printer is turned on and the platen is turned manually, a good deal of resistance can be felt. Although the factory in Japan claims that such manual operation causes no damage, using the line feed or the form feed is preferred.

Doing-It-Yourself

Going beyond these simple preventative measures requires a giant step—removing the case from the PC and tinkering around inside. Unless you have sufficient electronics acumen, it's best to keep hands off.

Outside of disk-drive head cleaning, demagnetizing, and installing memory boards or similar options, there is little need to go inside the PC. Only two internal parts—the rubber drive belts in the disk drives and the cogged belt in the printer—are ever likely to need attention if the PC is properly cared for and protected. Check them after a year of operation.

Although user service is not recommended, a book outlining the proper procedures for these checkups, as well as all repair and service operations, is available from IBM through your PC dealer. Called *Hardware Maintenance and Service*, the big loose-leaf binder retails for $155.

Not a book to curl up with at night, it's designed for dealer service people and hard-core "tekkies." */PC*



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CIRCLE 403 ON READER SERVICE CARD

xpensive devices are available to help protect
ur files—and in some cases, your PC itself.

Block That Bolt, Hey!

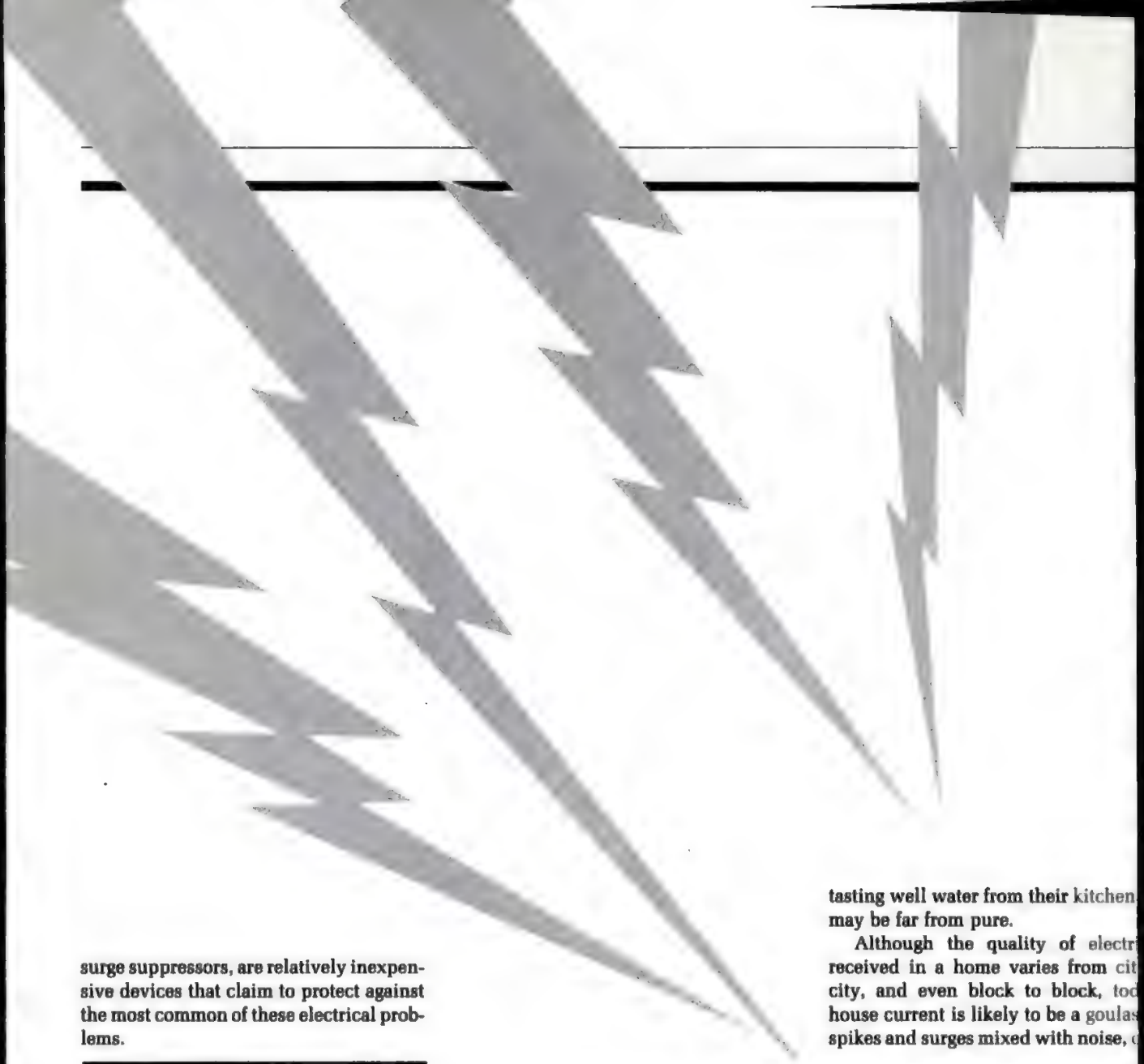
A direct hit by a bolt of lightning usually leads to severe consequences for the average Personal Computer. When the smoke clears and the fire rtment has gone away, few PC owners would expect the data in the charred ins to be intact.

lost PC users don't realize that their puters are prey to similar, much more mon (though perhaps somewhat less tacular) destructive forces. Miniature es of lightning or abnormally high ge pulses ("spikes") may flash into puters hundreds of times a day, hidwithin the "protective" plastic coatf the power cord.

Although few of these transient pulses are powerful enough to zap a PC to oblivion, they and other power line-associated problems are estimated to cause nearly 70 to 90 percent of malfunctions in microprocessor-based equipment, including of course, the IBM PC.

These power line surges and spikes can cause a multitude of hardware and software errors, ranging from the troublesome to the expensive, from the misinterpretation of a single character or a garbled file to a completely lifeless computer.

Power line conditioners are designed to minimize or eliminate computer problems that originate with the utility company-supplied line current. Two of these conditions in particular, line filters and



surge suppressors, are relatively inexpensive devices that claim to protect against the most common of these electrical problems.

MOST PC users don't realize that their computers are prey to common destructive forces.

Despite certain similarities, the two are actually quite different, though equally confusing. Claims for both range from the modest to the miraculous, and choosing a particular unit—or whether to buy one at all—is perplexing at best and may seem impossible.

In effect, both line filters and surge suppressors act as insurance policies. As with insurance, deciding whether they are necessary or desirable requires an understanding of both the problem they are supposed to protect against and its consequences, and then comparing the various alternative solutions available.

Power Line Problems

In today's civilized and computerized world, much is taken for granted. For instance, most people assume that the sun will rise tomorrow, that the Personal Computer will make life easier, and that the electricity from the wall outlet is exactly the perfect portion for the appetite of the PC. Learning that any of these assumptions may be wrong inevitably comes as a shock (as it may tomorrow morning).

For most computer users, the biggest shock may come from discovering that plain household electricity, like the even-

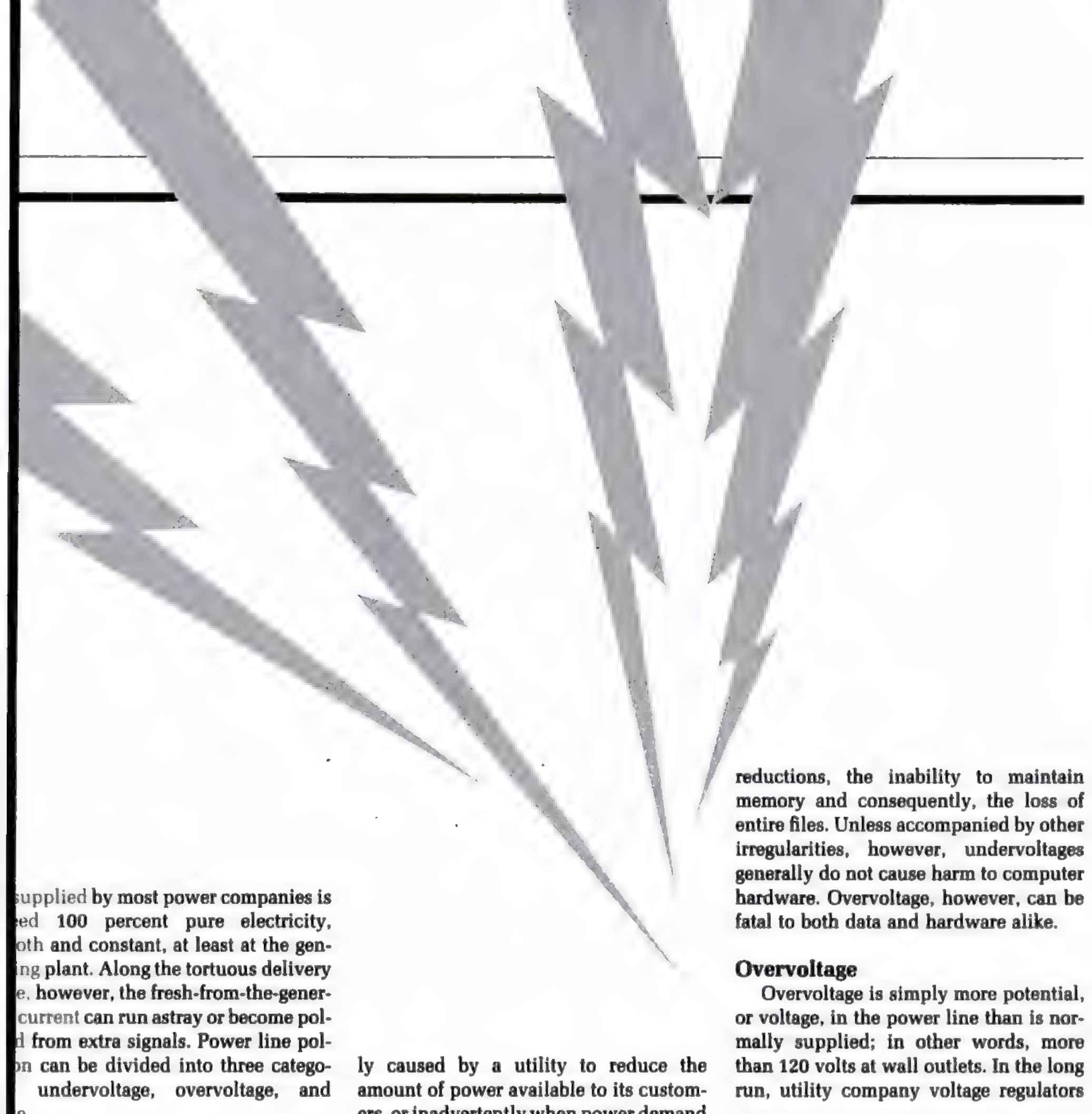
tasting well water from their kitchen, may be far from pure.

Although the quality of electri received in a home varies from cit city, and even block to block, too house current is likely to be a goula spikes and surges mixed with noise, o

POWER line-associated problems are estimat to cause nearly 70 to percent of malfunctio in the IBM PC.

and interruptions. Invisible and un ceived, these aberrations sneak d power line and electric cord alike. Sh precautions be neglected, they can into your PC and wreak havoc.

In fairness to the public utilitie must be admitted that the original p



supplied by most power companies is ed 100 percent pure electricity, oth and constant, at least at the gen- ng plant. Along the tortuous delivery e, however, the fresh-from-the-gener- current can run astray or become pol- d from extra signals. Power line pol- n can be divided into three catego- undervoltage, overvoltage, and e.

dervoltage

Undervoltage is just what its name lies, less than the nominal 120 volts everyone assumes to be in the wires. most noticeable undervoltage condi- is, of course, a complete lack of elec- ty, a blackout or power failure. sed by anything from the failure of a erating plant or downed power line to unpaid light bill, a complete power ure can last from a fraction of a second he arrival of the next paycheck. ough a complete power outage usual- oes not hurt computer hardware, an rruption only a fraction of a second inevitably causes whatever is in tile RAM to be lost.

A more subtle undervoltage condition e brownout, a temporary reduction in voltage. Brownouts may be purpose- ly caused by a utility to reduce the amount of power available to its customers, or inadvertently when power demand exceeds generating capacity. Shorter term brownouts or voltage drops are often called "dips" or "sags," and usually result from a sudden heavy load being switched onto the power line.

Although power companies have regulators that constantly adjust voltage to an optimum level, they take time to detect voltage irregularities and react. During the reaction period, a sag results.

If the voltage drop from a brownout or sag is not very great, typically less than 10 percent, the power supplies built into most electronic equipment, including the IBM PC, compensate by using their own internal voltage regulators.

However, when the line voltage drop is more than the internal regulator of the equipment can handle, erratic operation may result. In a computer system, this can mean garbled entries or, during severe reductions, the inability to maintain memory and consequently, the loss of entire files. Unless accompanied by other irregularities, however, undervoltages generally do not cause harm to computer hardware. Overvoltage, however, can be fatal to both data and hardware alike.

Overvoltage

Overvoltage is simply more potential, or voltage, in the power line than is normally supplied; in other words, more than 120 volts at wall outlets. In the long run, utility company voltage regulators keep line voltage near its nominal value, easily within 10 percent, close enough that the internal regulators of most electronic gear can handle the fluctuations. By their nature, however, utility company voltage regulators make changes only over the long term (in the world of electricity, the "long term" means seconds) because of the time it takes for them to detect a variation and correct for it.

BOTH LINE filters and surge suppressors act as insurance policies.

Hence, although long-term overvoltages greater than 10 percent are rare, overvoltage irregularities lasting less than one half cycle—1/120 of a second—occur frequently, and they can be destructive to both data and equipment.

ALONG THE tortuous delivery route, the fresh-from-the-generator current can become polluted from extra signals.

Some short-term overvoltages reach 6000 volts and peaks as high as 25,000 volts have been measured. The shortest of these overvoltages are often called "spikes" or "transients," and typically last less than a microsecond (one millionth of a second) and perhaps less than a nanosecond (one billionth of a second).

Longer overvoltages are often called "surges." Together, spikes and surges can be the greatest threat to your IBM PC outside of a 4-year-old child with a jelly sandwich aimed for the disk drive slot.

High voltage transients primarily arise from two causes: natural events and inductive load switching. The most dramatic natural event, lightning, is nothing more than a giant electrical pulse or transient. No doubt, a direct hit by a stroke of lightning is one overvoltage condition most Personal Computers will not survive.

Sources of Surges

But lightning does not have to hi
computer to damage it. Should a bol
of the blue strike the power line that
plies a computer, part of its million v
of energy may be routed down the p
line. Nor need the lightning even t

UNDERVOLTAG generally does not cau harm to computer hardware.

the wires directly. It can induce ten thousands of volts into wires simpl flashing near them.

Inductive load switching ca spikes and surges by instantly releas large amount of electrical energy that stored in a magnetic field. Energizi magnetic field in the coils of wire ins motor or transformer actually stores trical energy. When the device switched off and the magnetic field lapses, all of this stored energy is inst ly released but has no place to go

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CIRCLE 151 ON READER SERVICE CARD

than back down the power line. The result is a giant voltage pulse that radiates throughout the power system until it spreads itself too thin to be noticed or until it is absorbed by some device. Woe unto the poor Personal Computer that it finds first.

OVERVOLTAGE can be fatal to both data and hardware alike.

Overvoltage spikes and surges are harmful to electronic equipment for several reasons. The filter circuits in computer power supplies may let transients pass through almost unimpeded, and the resulting pulse now inside the computer itself may be mistaken for a pulse of data.

Essentially, all wires act like small transmitting and receiving antennae; the power cord broadcasts the spike and the wires carrying data inside the computer receive it. Consequently, even when the power supply filters stop a pulse from directly invading the computer circuitry, the pulse may be "capacitively coupled" into other wires. The result is errors in the data. Further, pulses that sneak through the power supply or are capacitively coupled can be so powerful that they damage the circuitry inside the computer. Or they may destroy the computer power supply itself, leading to an out-of-service computer and a hefty repair bill.

In any given power system, switching transients may be created many times a day when an electric power company reroutes feed lines serving the utility grid. On a smaller scale but just as dangerous, such transients can be created within the confines of a home when a motor—say the refrigerator or air conditioner—starts or stops.

There is no safety or escape from spikes and surges. Although transients that travel long distances are dissipated by the resistance of the wire in the power grid—which means the farther you are from your utility substation, the safer your PC is—greater stretches of wire are more susceptible to natural phenomena, like lightning.

Computer users in Manhattan may be relatively safe from natural transients. Because their power lines are mostly short and underground, they are pro switching transients from nearby su tions. In Breadbasket, Iowa, how where the nearest substation is s where over the edge of the earth, ligh is a bigger threat.

Should you try to avoid the tran problem entirely by building your power station, say a 40-megawatt w mill, your PC would still be susceptib transients created by appliances w your own home.

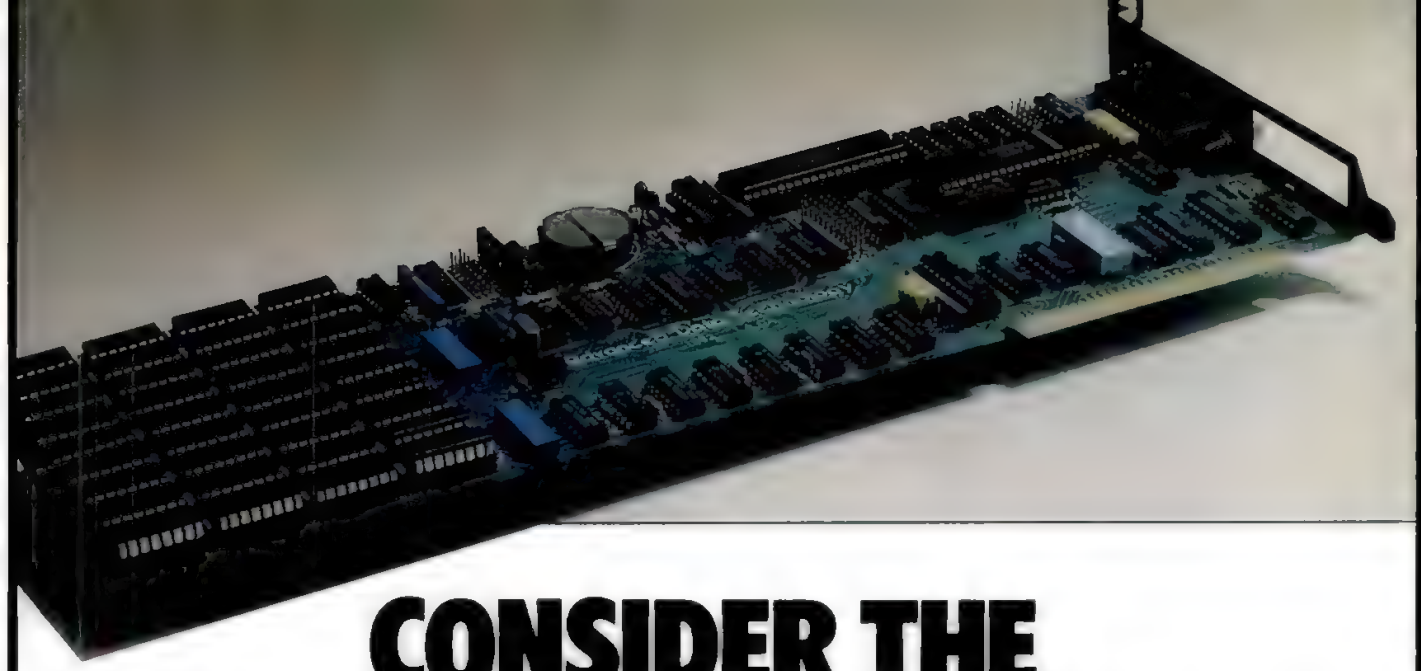
Noise

Noise is also a signal. It can affec normal electrical signal in the su wires. The dividing line between and surges can be tenuous. Strictly sp ing, lightning is a noise source induces spikes in power lines. In ge however, noise signals are of a much er level than either spikes or surges. are usually in the volt, rather than volt range and may be periodic, peaks occurring up to millions of tim second.

SPIKES AND surges can be the greatest threat to yo IBM PC outside of a year-old child with jelly sandwich aime for the disk drive slo

The most common source of noi electromagnetic interference or (E more often described as radio frequ interference (RFI), which is essen errant broadcast of communications nals and electromagnetic pulse (E which consists of lightning, autom ignition noise, or power line spikes radiate energy from the wires. Jus spikes and surges could be cou inside the computer, power lines ac receiving antennae, plucking other, n fering signals out of the air. Technic these noise voltages are "induced" the wires.

Common sources of interference



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velop your PC's full potential.
many other competitors have only r or five real features with their nbination cards. But while the others re trying to count to higher nbers, we were designing real tures into our card. Real features e a BSR X-10 AC line con-



ler interface, game t, and program- ble 8 bit I/O and it output ports. d, of course we have the rnal features of 64K to 256K of mory with parity, serial interface her COM1 or COM2), Centronics- mpatible parallel interface (LPT1, T2, or LPT3), and Clock/Calendar h Battery backup. To top it off, we er the print spooler and RAM disk tware free of charge with purchase he card.

y Us?
ars of experience by our design staff he industrial computer market have ulted in fifteen different computer ds used in process-control systems. plications which demand the most n any piece of hardware. We ieve you have the right to demand mpetence and expertise. Our card sses the test.

o to nine functions in 15 minutes.
r installation documentation is extreme detail, with pictures and olanation of how to install the board urself. All you will need is a screw- ver. The board is completely silk- reened and solder masked. In addition, a comprehensive burn-in program is undertaken on all cards to insure the highest measure of reliability.

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wer Line Conditioners: Line Filters d Surge Suppressors

urce: Manufacturers' literature)

ker	Model	Type	Cost	Comments
sta Systems, Inc. 3440 Roberto Court San Luis Obispo, CA 93401 (805) 541-4160	Voltage suppressor	Surge suppressor	$29.95	Other protection devices also available.
narc Industries Inc. 21 Governor's Court Baltimore, MD 21207 (800) 638-9098 (301) 298-2629	C-120 Q Clipper	Surge suppressor	Contact manufacturer	Transient protected line cord, parallel type, three outlets.
	CS-15-6	Surge suppressor	Contact manufacturer	Six-outlet strip with switch and circuit breaker.
	DP-1102	Regulator and Surge suppressor	Contact manufacturer	Two outlets in metal box, 9-inch cord, 200 VA.
	DP-1105	Surge suppressor	Contact manufacturer	Four outlets, 500 VA. All models: response time, under 5 nanoseconds; clamping voltage, 160 V; handles 4.5-kw surges, 15 A. loads. Other models available.
tronic Protection Devices Division CNS Electronics Corp. 5-9 Central Ave. Waltham, MA 02154 (800) 343-1813	Lemon	Surge suppressor	$ 59.95	Mounts on wall outlet, gives six outlets.
	Lime	Surge suppressor	$ 89.50	4.5-foot cord, switch, six outlets.
	Peach	Noise filter and Surge suppressor	$ 97.50	Mounts on wall outlet, gives three sockets.
	Orange	Noise filter and Surge suppressor	$139.95	4.5-foot cord, switch, six sockets. All models: response time under 5 nanoseconds, handles 10.8-kw surges, 15-A loads.

mpere, **kw**=kilowatt, **V**=volt, **VA**=volt ampere

rical motors, particularly high-pow- ones, automobile ignition systems, the CB radio operator down the t.

oise on the power line can creep into electrical device. You will most like- otice it on the home hi-fi system or ision set, the whirr as the refrigerator the steady clackety-clack as the nbor tunes up his '53 Studebaker, the stuff-the-kids'-ears-full-of-cotton uage that erupts when the CB enthu- warms up his kilowatt linear ampli-

kewise, the same noise signals can nto computer systems by slipping gh the power supply circuits or being coupled around it, but there is a big difference. Instead of making sound from the noise, the computer is likely to confuse its pulses with data. The result can be garbage on the CRT and errors piled into files.

LIGHTNING does not have to hit the computer to damage it.

The IBM PC power supply circuitry eliminates most noise signals. Particularly strong noise signals, however, can get through.

Avoiding Power Line Problems

Although add-on devices that protect against any conceiveable power line-related problem are available, few of them are cost-effective for every computer user.

Because undervoltage problems are rare—estimated to account for only 2 percent of all power line problems—and by themselves usually won't cause permanent harm to computer hardware, expensive cure-all power conditioners called uninterruptible power supplies (UPS)

Power Line Conditioners: Line Filters and Surge Suppressors

(Source: Manufacturers' literature)

Maker	Model	Type	Cost	Comments
Electronic Specialists, Inc. 171 South Main St. Natick, MA 07160 (800) 225-4876 (orders) (617) 655-1532	ISO-1	Noise Filter and Surge suppressor	$ 69.95	6-foot cord; three outlets; handles 4500-watt surges, 18 watt loads; optional circuit breaker and light.
	ISO-3	Noise Filter and Surge suppressor	$104.95	Similar to above but handles to 6500-watt surges.
	AC-SFK-335	Noise Filter and Surge suppressor	$ 59.59	Maximum load of 1250 watts more models available.
Isoreg Corporation 410 Great Road Littleton, MA 01460 (617) 486-9483	16-025-12-12-12-2-UU	See "Comments"	Contact manufacturer	250 VA ferro-resonant regula surge suppressor; models fro 125 VA to 50,000 VA.
RKS Industries 4865 Scotts Valley Dr. Scotts Valley, CA 95066 (800) 892-1342 (408) 438-5760	SS-120 H	Surge suppressor	$ 89.50	Wall mounting, two outlets.
	SS-120 P	Surge suppressor	$ 69.50	Plugs into a terminal strip to protect all outlets on strip.
	SS-120 M	Surge suppressor	$112.00	Systems model, six outlets. All models: 200-V clamping; response time, 5 picosec. Handles 4.5 kw surges. Many more models
Sun Research, Inc. Box 210 Old Bay Road New Durham, NH 03855 (603) 859-7110	MDS-150	Ferro-resonant voltage regulators and Surge suppressors	$90	150 watts
	MDS-250		$185	250 watts
	MDS-600		$275	600 watts
	MDS-1000		$500	1000 watts Other models available

A=Ampere, **kw**=kilowatt, **V**=volt, **VA**=volt ampere

may not be a good protection investment, particularly in a home rather than business environment where losing data isn't especially tragic. UPS prices range from $2 to $5 per watt of power rating, several hundred dollars for a unit to handle one IBM PC. Line filters, which give minimal protection from power line noise, generally cost as little as a few dollars.

Surge suppressors, which protect against most potentially damaging spikes and surges, cost from about $20 to $100. The range in price roughly corresponds to the amount of protection they give. Be careful: Various units are called "surge suppressors," but different devices use different designs, some of which are more effective than others. Although the terms "line filter" and "surge suppressor" are sometimes used interchangeably, you should be aware of the difference because the wrong device can be fatal to your computer.

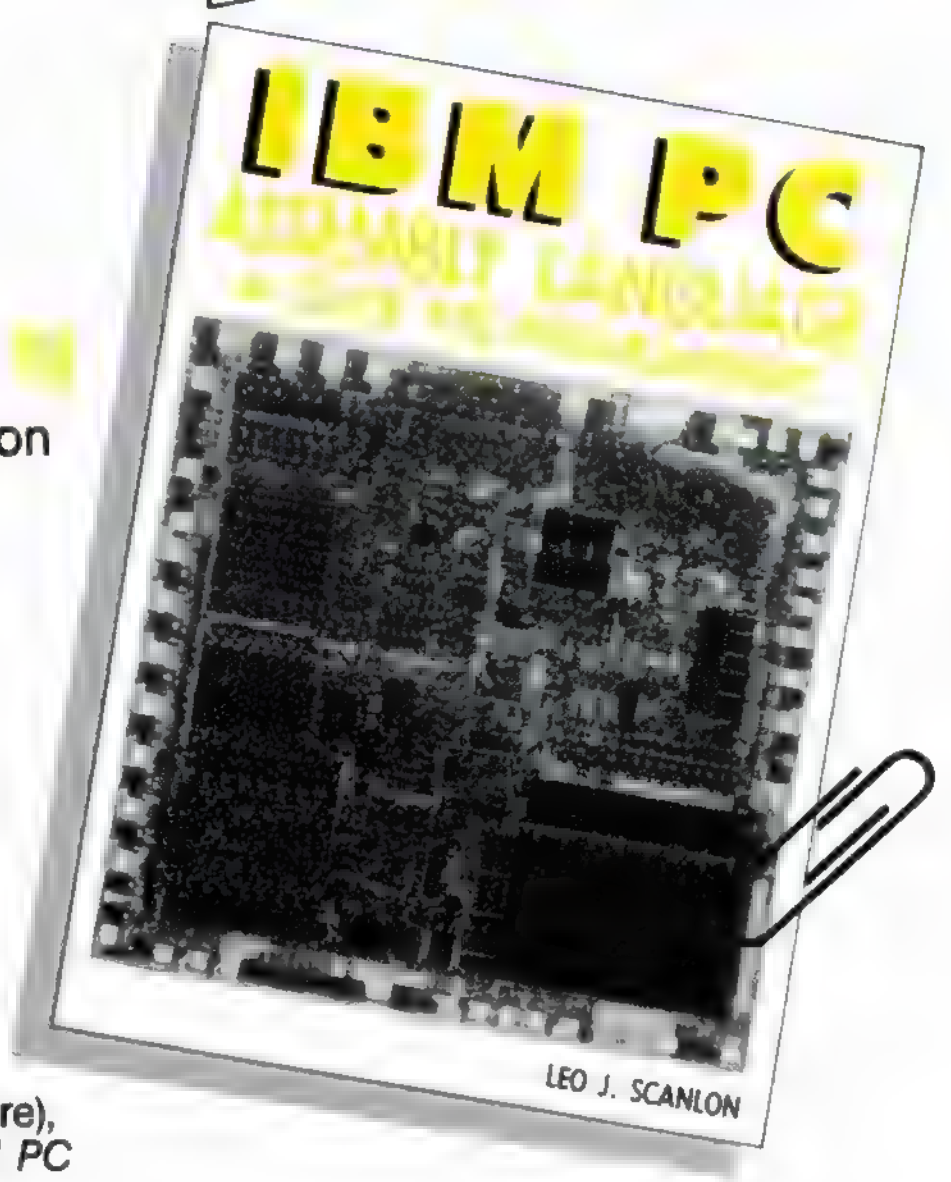
THERE IS no safety or escape from spikes and surges.

Most electronic circuit components conduct electricity of different frequencies differently. In particular, capacitors conduct high frequencies better than frequencies, and inductors (or "chok conduct low frequencies better high. The right combination of induc and capacitors will favor 60 cycles all other frequencies, letting line cu pass and stopping noise. In effect, su circuit "filters" out the noise, hence name "line filters." Line filters by th selves, however, do not eliminate sp and surges.

The power handling capacity of fi is small. The ferrite inductors use some line filters can "saturate," bec overloaded with electricity, by the mendous power in a spike. Consequen much of the spike's energy gets thro Overvoltage energy can also whiz r

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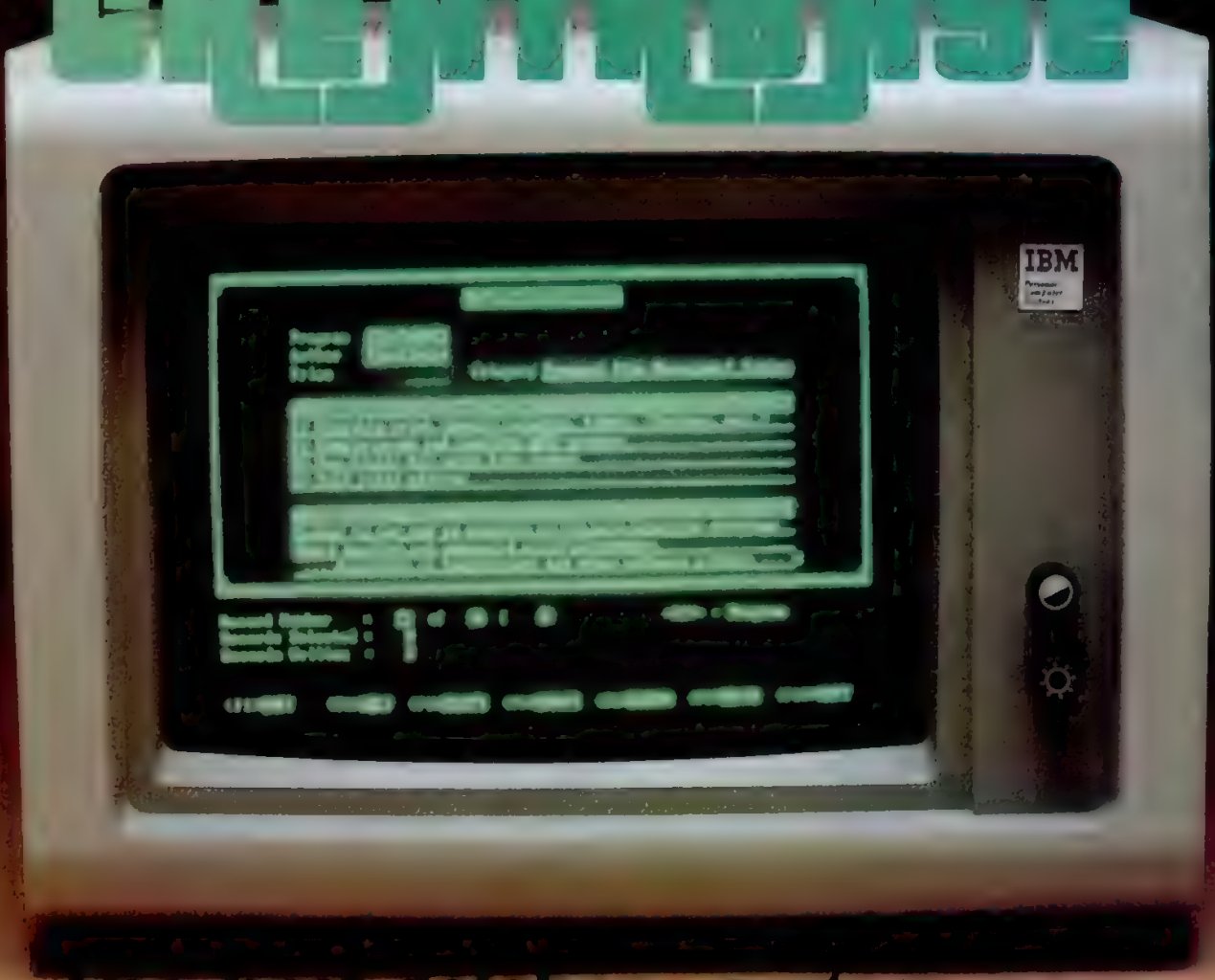
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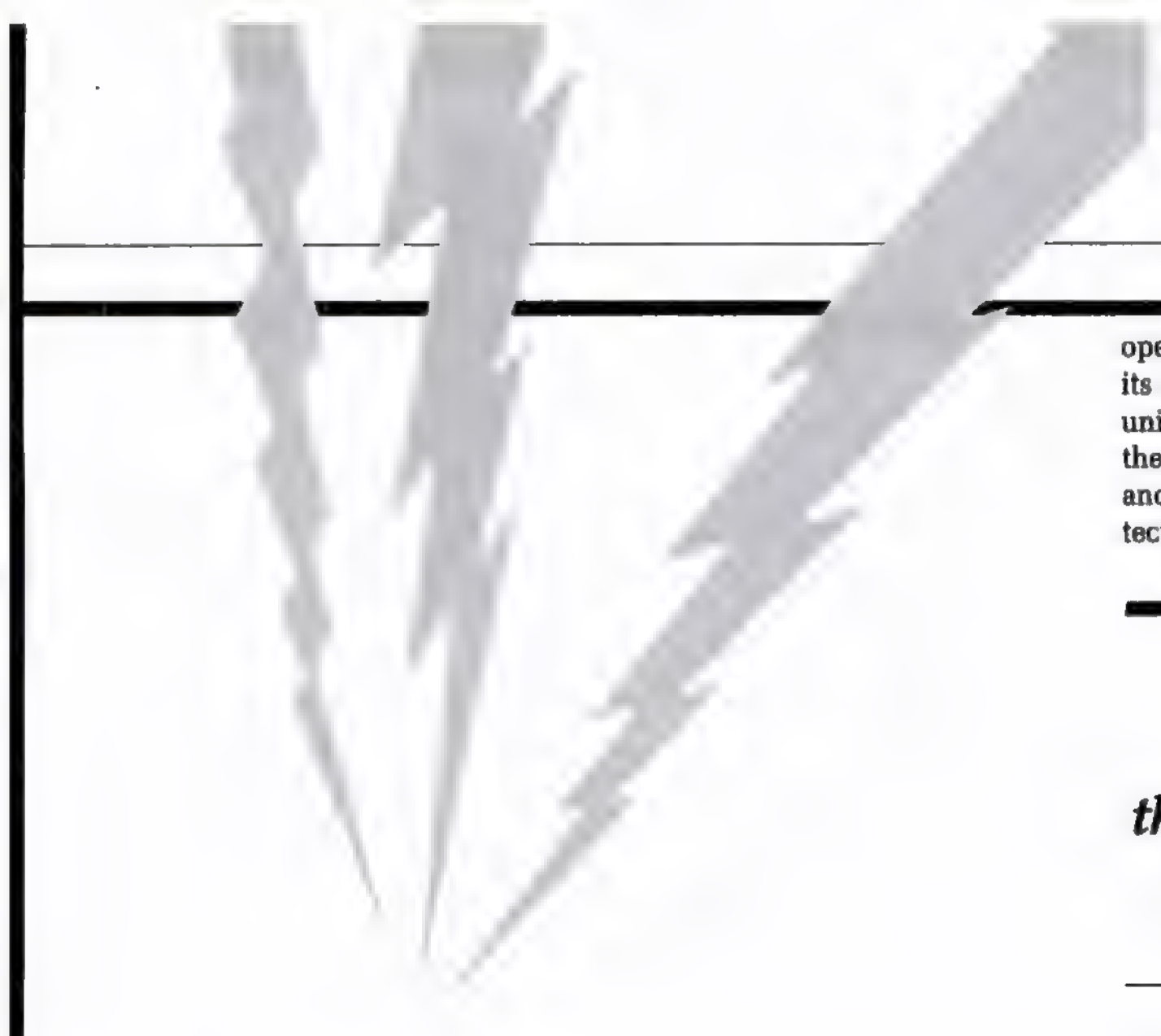
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many filtering capacitors.

For greater protection, many surge pressors use special semiconductors conduct electricity only when the age across their leads is greater than a n potential. When a spike exceeds level, the overvoltage is clipped off. voltage at which clipping begins is n called "clamping voltage." Note, ever, that these suppressors reduce er than eliminate spikes and surges. A safety margin must be provided veen normal operating voltage and the mping voltage. In general, this safety

SOLDERING inside your IBM PC ill void the warranty.

gin is 100 percent, which means, for ons known but to circuit designers God, that some surge suppressors allow potentials as high as 600 volts k-to-peak to pass unimpeded. Better ge protectors have lower clamping ages—under 200 volts.

Another type of surge suppressor, usu- more expensive, uses a ferro-resonant sformer (perhaps in addition to other ns of protection), which is designed to w only normal 60 cycle electricity to s through it, absorbing any aberrations. As a side benefit, many of these transformers store enough energy to "carry the load," or operate a computer, during a brief power interruption, usually limited to about ½ cycle (1/120 of a second) long. The usefulness of a surge protector is determined by two factors: how fast it works and how much energy it can handle.

The surge suppressor must react in a period shorter than the length of the shortest pulse it is supposed to protect against. Therefore, when comparing the specifications of two different models, generally a faster response time or clamping speed is better. Response times may be as short as picoseconds—trillionths of a second!

The surge suppressor must be able to handle all the power in an overvoltage pulse, which may be awesome indeed. The larger the energy handling capacity, the better. Some units claim to handle millions of watts.

Other Considerations

Sometimes power line protection devices are classified as "series" or "parallel." A series device absorbs the unwanted signal before it reaches the computer; a parallel device shorts out the potentially-damaging signal. This difference is most apparent when a power-line problem destroys the protection device itself—an unlikely occurrence—but it can happen).

A dead series-type unit will no longer operate a computer, and therefore makes its condition apparent; a dead parallel unit will run the computer, but you might then be unaware that the device has failed and that you consequently have no protection.

NOISE ON the power line can creep into any electrical device.

On the more practical side, depending on its design, a series filter might not protect its multiple outlets from interfering with one another. A printer plugged into one of the outlets on a series filter may generate spikes that could be passed to a computer using another outlet on the same filter box. Most parallel devices are not susceptible to such interaction.

(Line filters may be series or parallel; semiconductor surge suppressors are usually parallel; and ferro-resonant surge protectors are series or, more often, a combination of both.)

Should you get out a screwdriver and open up one of the commercially-available line filters or surge suppressors to see what's inside, you may be disappointed indeed. Many contain but a few cheap parts. If you wanted to, you could buy the same electronic components and install them inside your computer yourself.

This is not a good idea for a couple of reasons. Soldering inside your IBM PC will void the warranty, and if you don't know what you're doing you're inviting disaster. Besides, your time is valuable. Remember: You bought the computer to save your time. Once you add in the cost of that time for the labor of installing the parts, the factory-made units are a bargain indeed.

Line conditioners that are approved by Underwriters' Laboratory (UL) assure you protection that is safe to install and use.

Using any commercial surge suppressor or line filter is easy—just plug it into a wall outlet, and plug your computer into it. Nearly any of them can be good insurance for your computer investment. */PC*

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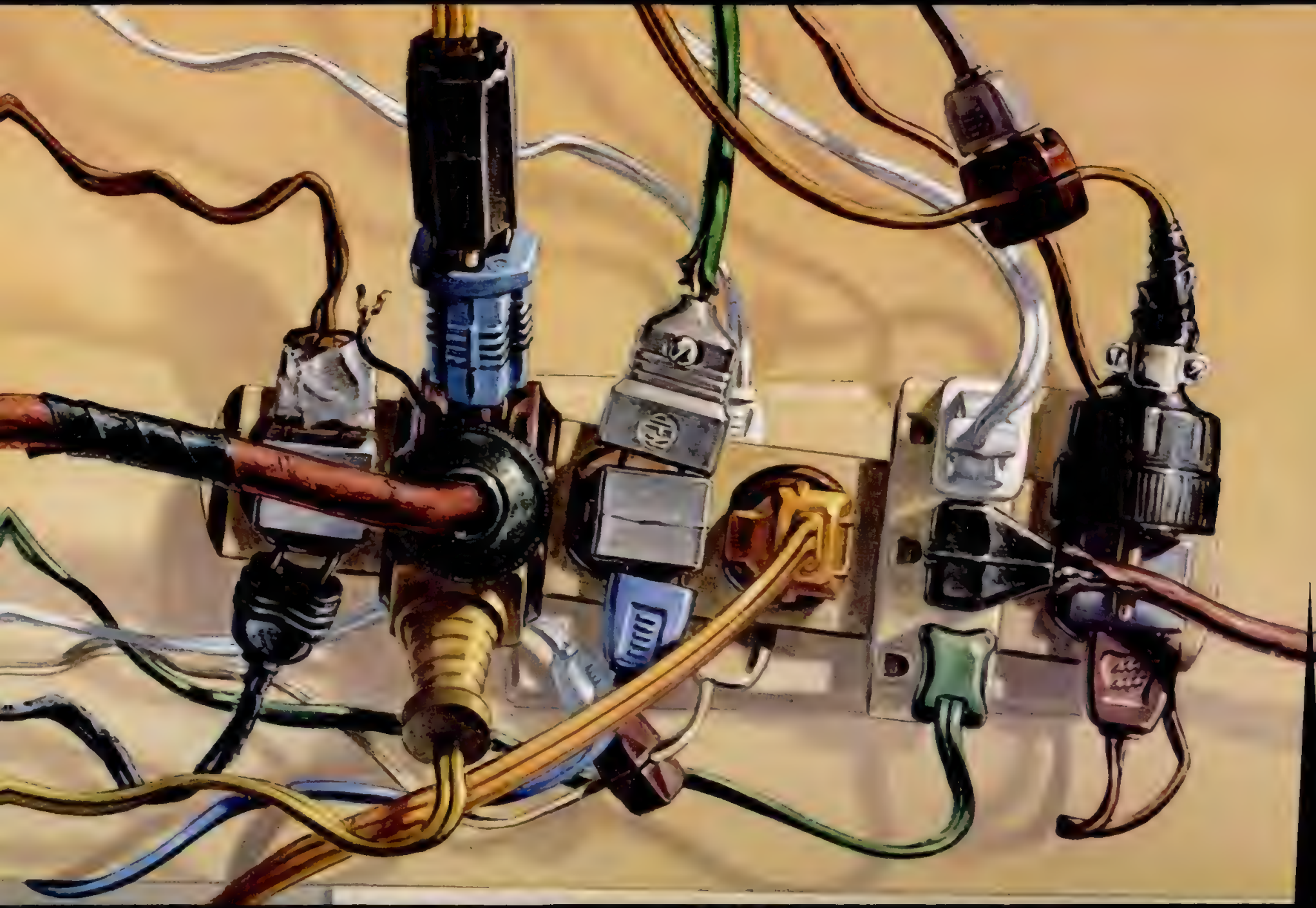


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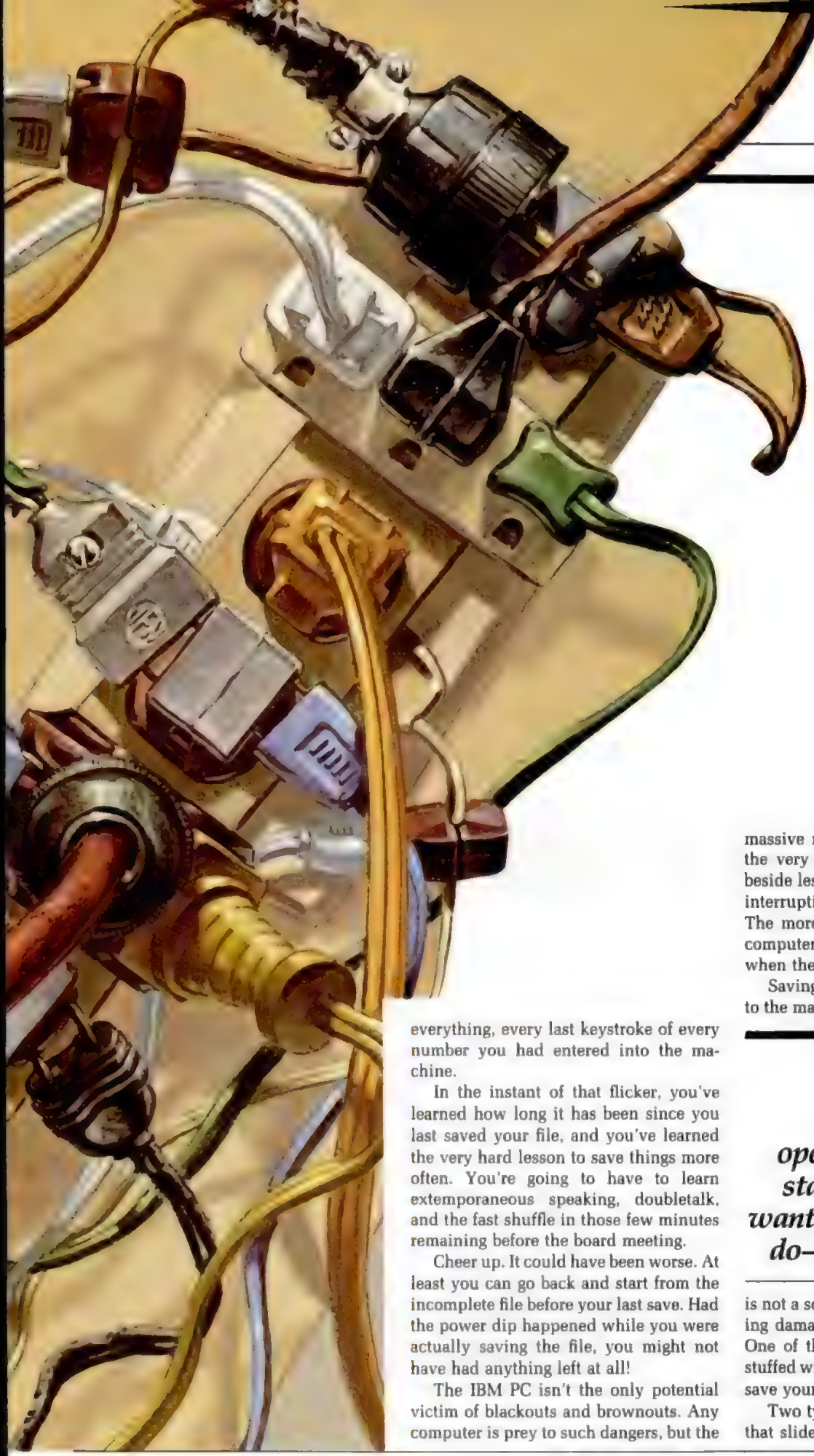
Living With Lapses In Your Power Line

No doubt now about why you invested in an IBM PC with that extra half-megabyte of memory. You're buzzing through a spreadsheet the oof Connecticut, analyzing the compe- m down to the tiniest fraction of a yen. dboard meeting is in half an hour, and answers to every last question your seagues will throw at you are locked in : multi-columns.

You pause for a second in a daydream of raises and promotions, but in a wink, you're awakened by the chirp of the computer. The screen is lit, obediently awaiting your next command, but the spreadsheet is gone! The operating system is staring at you and wants to know what to do—and so do you!

It wasn't a blink but a flicker, a power line dip or shutdown only a fraction of a second long, yet long enough to wipe out





everything, every last keystroke of every number you had entered into the machine.

In the instant of that flicker, you've learned how long it has been since you last saved your file, and you've learned the very hard lesson to save things more often. You're going to have to learn extemporaneous speaking, doubletalk, and the fast shuffle in those few minutes remaining before the board meeting.

Cheer up. It could have been worse. At least you can go back and start from the incomplete file before your last save. Had the power dip happened while you were actually saving the file, you might not have had anything left at all!

The IBM PC isn't the only potential victim of blackouts and brownouts. Any computer is prey to such dangers, but the

massive memory capabilities of the
the very same ones that make it s
beside lesser machines, also make po
interruptions and dips more expens
The more volatile solid-state memo
computer has, the more it stands to
when the lights go out.

Saving files more often, writing t
to the magnetic security of disk mem

THE operating system is staring at you and wants to know what do—and so do you

is not a solution but a means of mini
ing damage. It's also counterproduct
One of the reasons your computer
stuffed with an oversupply of RAM w
save your precious time.

Two types of add-on devices and
that slides into an expansion slot in

PC chassis are touted as saviors from power line-induced sacrifice of RAM: age regulators, uninterruptible power ems, and add-on CMOS memories. three differ considerably in the pro- on they provide, how it's achieved, most particularly, cost.

The first two can be especially confus- to the electronically innocent. More- , the devices in each class vary con- rably in effectiveness. Some give

THE MORE volatile solid-state memory a computer has, the more it stands to lose when the lights go out.

plete protection from nearly any er line related problem; others offer nore protection than already available hin the IBM PC.

tling Brownouts

The designers of electronic devices me that they will be operated under ain conditions, the first of which is an quate continuous supply of electricity given quality. Voltages exceeding the st-case expectations of the designer damage your PC. Voltages below the ected level may impair its function. If voltage supplied to a computer ever s below the minimum, the PC may not ble to maintain its memory.

Although noise filters and surge sup- ssors can and do improve the quality tility company-supplied electricity by inating power line garbage, they can- handle undervoltage conditions, and are designed to cope with long-term rvoltages. However, as their name lies, voltage regulators are designed egulate or control the voltage supplied electronic (and other) equipment, ping its level as near to the optimum ossible. When the power line voltage s, the voltage regulator "cranks" the el back up; when the line voltage rises, ranks its output back down so that the nputer (or other device) attached to the regulator receives a constant voltage.

Of course, voltage regulators are nothing new or unusual. Utility companies have used them for decades throughout their power grids to keep the electricity they supply at the proper level. The regulators that the utilities use are huge devices that consist of large transformers with a number of "taps" or "windings," outputs set at different voltage levels. Motors operate a series of switches that select the taps supplying the most appropriate voltage.

Although smaller versions of these mechanical regulators are available for business and industrial users, few are used in conjunction with personal computers. A "small" mechanical regulator may still be many times larger than you would need. Being mechanical, they are slow, perhaps allowing voltage to dip long enough for data to be lost. Being mechanical means they eventually wear out, too, and their straightforward design offers no protection from noise and transients.

Another style of voltage regulator that shares these problems uses a motor to rotate the shaft of a variable autotransformer (a single-winding transformer with an adjustable output voltage.)

Electronic Alternative

Some of the problems of the mechanical regulator are overcome when solid-state electronics are applied to the tap-switching concept. Instead of mechanical switching, they can be switched electronically using high-power transistors or thyristors. The resulting devices have faster reaction times than their mechanical brethren and are not subject to wear. While they do give protection against dips and long-term overvoltages, such regulators still offer no protection against transients and noise.

The most commonly available (affordable) home-size units based on the tap-switching concept work by manipulating the magnetic field inside a specially-designed transformer. A "saturable reactor" regulator applies a DC control voltage to an extra control coil on the transformer. By "saturating" the transformer core, it prevents the output voltage from exceeding a preset level. (A saturated transformer is operating at its capacity.) The DC control current is determined by sampling the output of the regulator and adjusting it until the output is at the proper level.

Compensation for low voltage conditions can be achieved by applying enough DC control voltage to keep the transformer saturated to levels well below the lowest expected. It's a simple solution, but that constant application of extra power means that such regulators are inefficient; they take in much more power than they put out. Nor does such a regulator give protection from noise or transients.

Other common add-on voltage regulators may use a "ferroresonant" transformer, which is "tuned" into saturation much like a radio is tuned, by a capacitor in conjunction with an extra winding. Tuning makes the transformer favor one output state over all others so that it naturally resists any change in its output, either a change in voltage or in frequency. A ferroresonant transformer not only regulates current, but also suppresses voltage spikes and reduces line noise.

More elaborate regulators, like those manufactured by Isoreg Corporation, rely on similar principles but add further protection with additional shielding and other forms of built-in transient limiting. Any voltage regulator, however, has a limit to how much and how closely it can regulate.

NOISE filters and surge suppressors cannot handle undervoltage conditions.

The term "regulation" itself refers to how near to the desired voltage the regulator maintains its output. Often, this is expressed for a given variation in input voltage: Output voltage will not vary more than 1 percent for a 10 percent (or 1 volt for a 10 volt) change at the input.

The input voltage range of a regulator indicates the maximum variation that can be compensated for. It should be greater than or equal to the voltage variation expected at the outlet the computer will be plugged into.

The PC After Dark

As it comes from the factory, the PC is designed to handle voltage dips of 20 percent without flinching and excesses to 15 percent without damage. In fact, even when brownouts darken the screen, there is still a safety margin to ensure that the data stored in RAM stay intact.

The engineers at IBM feel that the input voltage tolerance of the PC is wide enough to handle typical fluctuations encountered in most operating situations. However, if your experience contradicts their sanguine expectations, be sure to investigate regulators with a wider range than that of the PC itself!

Every voltage regulator has a power rating in addition to the figures given for regulation. The power rating indicates the maximum load the regulator can handle within its specifications. The IBM PC carries a nominal rating of 200 watts, indicating that the minimum power rating required of a voltage regulator to handle it should be 200 watts (or 200 VA, volt-amperes). Computer-quality voltage regulators capable of handling the PC can be purchased for $200 to $300.

Internal Power Failure Protection

Voltage regulators cannot regulate voltage that isn't there. Although effective for brownouts, a regulator offers no salvation in case of complete power outages—blackouts—that last longer than a fraction of a second. Compared to the rest of the world, American utilities do an excellent job of delivering a continuous supply of electricity, but no utility can guarantee that its service will be free from interruptions. When the standard sources cannot supply what you need, you are forced to look elsewhere.

In the case of electricity, another source is not a bad idea. The best way to avoid all power line-associated problems is to avoid using the power line at

Alternate energy solutions abound these post-energy crisis times: solar p er, windmills, oil shale, magnetohy dynamics. Any of them can be adapte

THE PC is designed to handle voltage dips of 20 percent without flinching and excesses 15 percent without damage.

run a home or business or its compu But before you run out and negotia home fusion reactor, take note that ene independence is still expensive, and probably remain that way. Neverthel there is a common alternative to line rent—batteries.

A straightforward solution to po line problems is to run failure-sensi equipment directly from a battery sup In fact, entire telephone exchanges their umbilical cords to rooms lined v lead-acid batteries to guarantee conti ous service. The ambitious and inven PC user could lash together enough D cells to run his computer without fea glitches and dips.

Unfortunately, the IBM PC was designed to be especially frugal in power consumption department. If opt for Duracells, you may end up cha ing your double-A's more often than year-old's diapers.

The IBM PC as it comes from the tory in its corrugated white shipping ton is not to use energy sparingly, add-on RAM system for the PC will h reduce its appetite.

The standard IBM PC RAM meme the one subject to data loss due to po failure, is made with NMOS technolo NMOS describes the fabrication techn ogy and operating concept of the integ ed circuit chips.

IBM, like most other computer m ers, chose to use NMOS chips beca they are fast, compact, easy to des with, and relatively inexpensive.

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ıtegrated circuit chips using other nologies are also available. One, ɔd CMOS (Complementary Metal Ox- Semiconductor), offers an important ıntage: When it isn't thinking, it .ires extremely little power, much than a comparative NMOS memory. ny battery can keep its memory fresh ı year or more.

lecause it takes up more real estate on ɔrinted circuit boards, might not be as ɔdy as NMOS in many applications, can be very costly, CMOS is not used nost memory boards for the PC made BM or outside suppliers. When it is l, capacity is limited to a fraction of t would be available with NMOS ıs.

lowever, special CMOS memory ɔds are available with a built-in bat- that makes them independent of line er. When such boards are installed implemented properly, the data or ɡram instructions held inside them ain intact during blackouts, when the ; is accidentally pulled, and even n you turn off the PC.

)ne such memory board is currently lable from Tecmar, Inc. Called "For- leNot," it features a 32-kilobyte ca- ty and slides directly into one PC ınsion slot. List price is $995.

ılthough an alternate memory board ects data, it does not protect the PC f from spikes, surges, and all the other ıons on the power line. In fact, it is as ıerable as any other solid-state cir- ry to the vagaries of the utility compa- nd still requires a separate surge pro- ɔr when your PC is operated from tric supplies of doubtful quality.

nputing by Candlelight

Although the PC won't run directly ı a battery supply, DC battery voltage be converted to AC and boosted to the nal electric requirement of the com- ɔr. A device called an inverter does trick.

An IBM PC system can run off a com- ıtion of a car battery and an inverter, there can be problems with such a ple arrangement; when the battery ı out of life, so does PC memory. Also, ɔss a more expensive "sine wave" out- is specified for the inverters, the out- of the inverter may be "square wave" tricity, which can cause computers ɾe indigestion. Often, square wave outputs of inexpensive power inverters are supplied fully-equipped with glitches and spikes, suitable for electric drills but not fussy computers. You can avoid both of these problems.

A sine wave output inverter delivers electricity exactly like—maybe much better than—that delivered from wall outlets. And during the time normal line current is available, a battery charger can keep the battery adequately charged. Should the power fail, the battery itself will keep things going. No interruptions, flickers, or data losses.

Logically there is no reason such a combination would not work as advertised. Several companies have, in fact, put together all-in-one boxes with exactly those elements to create a device called an uninterruptible power system (UPS), although it would more properly be called a "standby power supply." As the name implies, however, a UPS supplies electricity without interruption. If the power fails, the computer and its volatile memory do not.

As a side benefit, a UPS based on such a design is the ultimate power line conditioner. Its output is essentially a completely isolated electricity generator, free from all the evil effects of switching transients, lightning, and line noise.

BEFORE you run out and negotiate a home fusion reactor, take note that energy independence is still expensive.

Beware, though, that not every so-called UPS isolates its output from the power line. The initial configuration described above requires that the battery charger not only charge the battery, but also supply enough power to operate the computer full-time. Some designers believe that much capacity is overkill, particularly considering that the charger must run the whole computer only when alternate power, AC line current, is also available.

To eliminate this perceived redundan-

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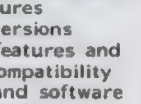
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cy, some systems are designed to route the AC power directly from the wall outlet to the computer, and switch over to the battery supply only in case of power failure. With this configuration, the battery charger need only be powerful enough to charge the battery slowly and keep it charged.

PC POWER requirements are determined by the particular functions you want to preserve in the event of a power failure.

The bottom line is that a much smaller charger can be used, and the potential price of the complete unit is lower.

The lower price of the standby-only units also buys a penalty; straight-through normal operation eliminates the line conditioning benefit of a true UPS because raw, unconditioned power line electricity may be routed directly to the unsuspecting computer. Better standby power systems also provide noise filtering and surge suppressing circuitry, but such additional protection is not necessarily built in.

Apart from that basic design difference, uninterruptible power systems and standby units vary greatly as to features and power capabilities. Both types of systems have two limitations: the capacity of the built-in inverter, which determines the maximum power that can be supplied at any given instant from its battery, and the battery capacity itself, which determines how long backup power will be available in event of a blackout.

Customized Protection

PC power requirements are determined by the particular functions you want to preserve in the event of a power failure. You can prevent data loss by plugging only the CPU, the IBM chassis itself, into the UPS, and by relying on a UPS with minimum capacity, in the range of 100 watts. In this case, the first thing to do when the line current fails is to save w ever is in memory. However, if you the IBM PC with a monitor that cann plugged in to a wall outlet separately the CPU, or if you want to coast throu power failure and keep slaving awa the computer, a larger UPS is neces because it must power the monitor as as the CPU. In reality, most users rec the greater capacity because the stan monochrome IBM monitor draws its er through the main chassis and it i practical to separate them. Remembe nominal rating of a standard IBM together with the IBM monitor is watts. A UPS with at least that capaci needed to keep it going.

Should you want to run your com er by electric lamplight instead of ca light during an outage, even more ca ity is required; the exact amount is d mined by what you plug in. How lon UPS needs to keep your system run depends more on you than your com er. If you're gung ho and nothing will vent you from squashing as much BA as you can into the helpless mach even in the dark, find a UPS that will ry you through the longest imagin power failure.

Usually, however, only a few min of backup is sufficient—enough tim realize what happened, evaluate the ation and determine that it may be h before power is restored. Then you shut down your computer systematic saving data until you pay the light b

Most computer users opt for a co nation strategy. Because most outage brief—under a minute—they prefe program right through them. Only w it looks like the local nuclear plant melted down and it will be a while be anyone is allowed back into the stat they pause to shut things down.

This requires a battery condition cator that shows how much longer UPS can carry the load. Unreconstru PC fanatics will watch the indicator keep everything rolling until the situa becomes desperate. Only then will shut the system down.

Your requirements for uninterrup power may not be so extreme. In any the protection you need, whether to g against surges in the line or assure a tinuous flow of energy is probably a able. Like the PC, the necessary eq ment is really an investment in time.

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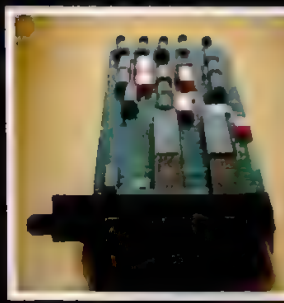
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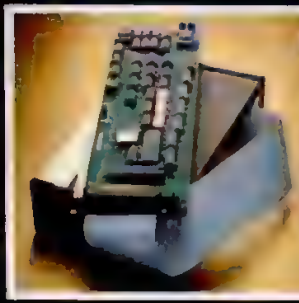
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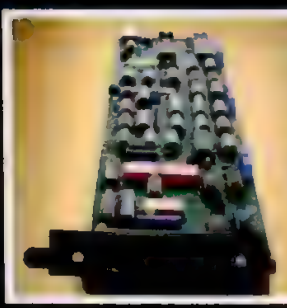
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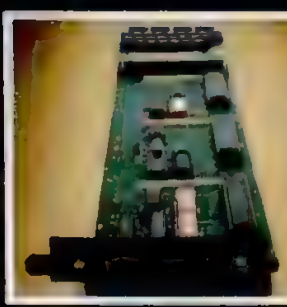
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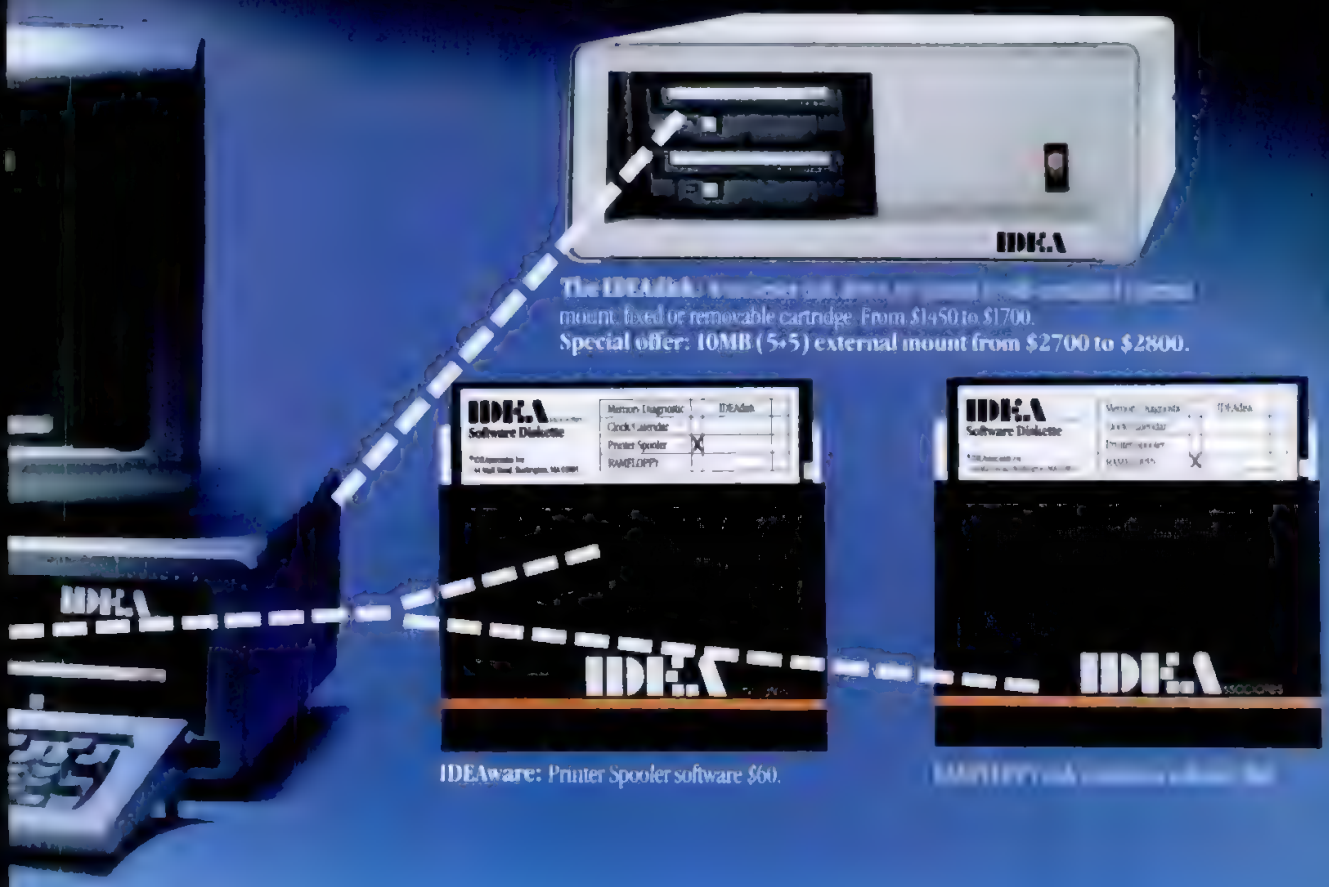
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arks of static electricity may seem harmless, but
ey can have a shocking effect on your PC.

Out, Damned SPARK

Unlike most problems that bug and bedevil the IBM PC, static electricity is not reluctant to make itself known directly to users as well. It's that ful, yet bothersome nip at your fin- ps every time you touch a doorknob a quick shuffle across the carpet.

hough it usually is merely irritating, c electricity can be dangerous. Its ous discharges can easily destroy del- integrated circuits and have even set xplosions that leveled entire facto- A mainframe computer system can rought to an abrupt halt by a single c flicker. A static jolt need not zap the puter directly to cause a problem. etimes a nearby static spark can cre- ufficient interference to cause a com- r to malfunction.

large systems, where downtime thousands of dollars per hour, static protection is a mandatory practice, even though the methods may be elaborate and expensive.

Personal computers, too, suffer when static is in the air. A small system user, such as a hobbyist, is likely to ignore these protection schemes. Anti-static sprays, carpets and mats, and anti-static chairs may seem at first to not be cost-effective additions to a home computer system. But once the cost of wasted time, frustration, and repairs is totaled up after a few static-caused problems, the prices of some anti-static alternatives seem more reasonable.

Hard and Soft Errors

The connection between static electricity and computer problems is not hard to see, particularly when the monitor's screen blacks out just after the little blue sparks start to fly. But static can cause

Photograph: Dennis Bettencourt

subtle problems as well, like data that changes mystically when unwatched, program bugs that crawl away and hide when searched for, or perhaps a single command's failure to execute properly. Usually static causes fleeting one-shot errors, but sometimes the damage can be irreversible.

All of the personal computer problems that can be caused by static are of two types: hard errors and soft errors.

A hard error is a failure in computer hardware, the electronic devices that make up the computer itself. Hard errors are permanent problems that won't go away. Often hard errors are irrecoverable because there is no normal way for a user to restore the system and get it running again after the error occurs. Solving a hard error will require a call to the repair shop.

Soft errors are accidental alterations of software in a computer program or data. Soft errors can occur during either program execution or storage. The results may range from programs that refuse to run to a single incorrect digit in a massive spreadsheet—or perhaps a missing minus sign on the bottom line.

If programs are backed up and the original data is still available, the computer operater usually can recover from an error, get the system up and running again, and make the necessary corrections to accidentally-altered data. Most soft errors are recoverable—in theory, at least.

Computer systems differ in their abilities to ward off these static-induced problems. The IBM PC, according to spokesman Dan Scherer, is immune to static shock, at least in comparison to other personal computers. The possibility of static causing a catastrophic hardware failure is remote.

The official word from the factory, in regard to soft errors, is that, given normal operating conditions, static protection is not necessary. "But it wouldn't hurt," noted Scherer.

Although the company says that soft errors are unlikely to occur, some users have noted strange consequences from errant static discharges upon the IBM PC itself—the monitor going blank is one.

The manufacturers of static prevention and protection supplies note static generation is an unpredictable p nomenon. Unusual and unforeseen charges of high intensity do occur, an electronic device is totally safe from t effects. The anti-static suppliers w have you believe that, rather than rel on an equipment manufacturer's as ances, the better alternative is to el nate static problems before they occur. Given these alternatives, a may prefer to err on the side of pre tion.

Sources of Static

To evaluate the magnitude of p lems caused by static electricity and effectiveness of possible solutions, first must understand what static is how it arises.

Ordinary electricity—the house rent used by applicances and home c puters—is most simply defined as a of electrical charge carriers (electr through a conductor such as a wire.

Static electricity is made of the s stuff as house current: that is, elect charges. However, these charges are moving, they are "static"—hence name. (Incidentally, this term has not to do with the "static" heard as r interference: the latter is also called mospheric noise.")

Although electrical charges are car everywhere, they usually don't c problems because they are true to t name, static. They create problems when some force causes them to mo

The push that gets static charges m ing between two points is a differen

Triboelectric Series

When two materials that appear on this list are rubbed together, the substance higher on the list will pick up a positive electrical charge, while the lower will become negatively charged.

POSITIVE

Asbestos
Rabbit fur
Glass
Mica
Nylon
Wool
Cat fur
Silk
Paper
Cotton
Wood
Lucite
Sealing wax
Amber
Polystyrene
Polyethylene
Rubber balloon
Sulphur
Celluloid
Hard rubber
Vinylite
Saran Wrap

NEGATIVE

—From Dictionary of Electronics, *edited by Rudolf F. Graf, Howard W. Sams & Co., Inc.*

Product Information

These are a few suppliers of anti-static products.

ACL, Inc.
1960 E. Devon Ave.
Elk Grove Village, IL 60007
(Anti-static spray)

Inmac
2465 Augustine Drive
Santa Clara, CA 95051
(Anti-static rugs, mats, and spray)

Misco, Inc.
404 Timber Lane
Marlboro, NJ 07746
(Anti-static spray)

National Field Sales, Inc.
2660 West Chester Pike
Broomall, PA 19008
(Anti-static spray)

United Technical Products, Inc.
32 Southwest Industrial Park
Westwood, MA 02090
(Anti-static carpet, mats, chairs)

ctrical potential, called voltage. Much Nature abhors a vacuum, she's also not ppy about voltage differences. She'd her that everything be at the same elec- al potential. Sometimes, in that pur- t, lightning bolts are hurled. A static charge going from your finger to doorknob is just another effort by ture to get back to a state of electrical

UNUSUAL and unforeseen discharges of high intensity do occur.

ality.

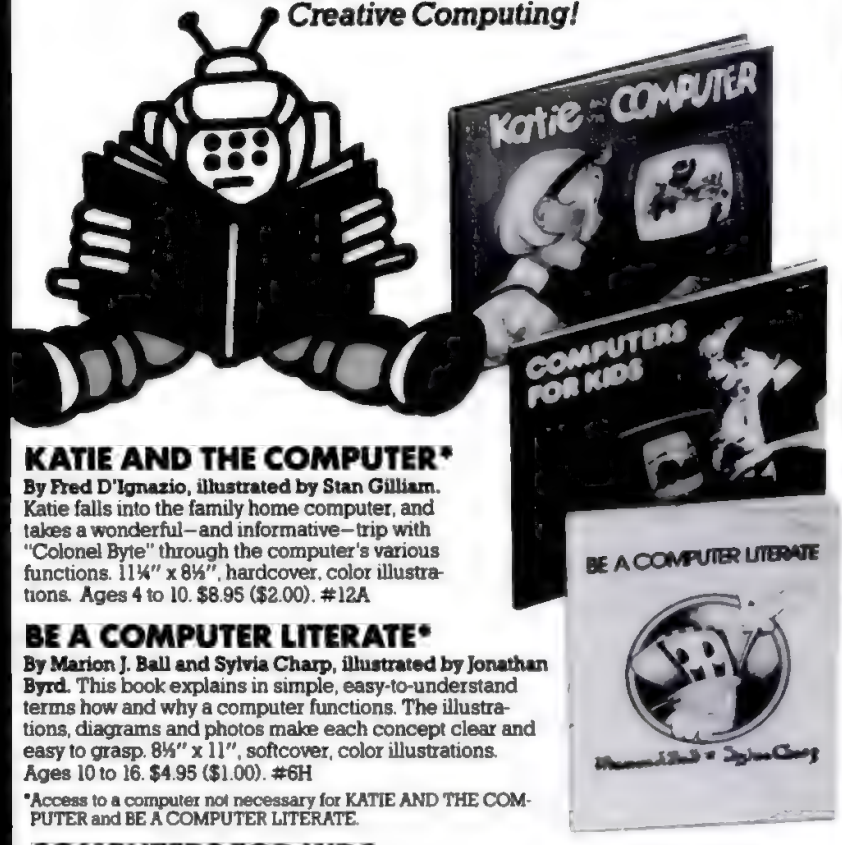
Friction is one way that differences in ential arise to generate static electrici- Electrical charges can be physically bed off one material and on to another ause some materials are more hospita- to negative charges than positive, le others behave in opposite manner. ic electricity will only be generated en dissimilar substances are rubbed ether; otherwise there would be no son for a charge to prefer one piece of erial over the other.

A set of different materials can be ked in order of their tendency to act negative or positive charges when bed. Such a ranking is called a "tribo- tric series." The farther apart two erials are in a triboelectric series, the ter the voltage potential is that can be ieved by rubbing them together. That ns if the triboelectric difference be- en two materials in the vicinity of a PC reat, then there is likely to be a static blem.

Walking across a carpet frequently erates static electricity because the t common materials used for shoe s are widely separated on the tribo- tric scale from the most common car- fibers. Other factors also influence the ic potential, including the area, pres- , and speed of contact, and the coef- nt of friction between the materials. Although friction contributes to the d-up of a static charge, it is not the method of generating static. When

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two contacting surfaces are separated faster than the charges on them can be redistributed, the surfaces may be left with net static charges. A static build-up such as this can occur when you rise quickly from a chair.

Static voltages higher than 25,000 volts are not unusual. In fact, a discharge may need to be as much as 3,500 volts before some people will notice a static shock.

Just because discharges are not felt by people does not mean they will be safe for a computer. Static discharges as low as 2,000 volts may cause computer problems; discharges over 10,000 volts are almost certain to.

The reason that a high-voltage static shock feels more like a tingle than an e trocution is because there is little cur (or amperage) in static electricity. Th fore, there is little power even when voltage is high.

Computers are vulnerable to st electricity however, because damag their MOS (metal-oxide semiconduc integrated circuits (of which there many in the PC) is caused by voltage w out regard to current.

IF THE RELATIVE HUMIDITY is high, the greater amount of moisture in the air will result in fewer static problems.



Discharging Static Safely

Although the materials used to m up carpets and shoes does not cha static problems can vary from day to and season to season. It's not that stat generated on some days and not on ers. Rather, under some conditions static charges are drained off before potential can get very high.

Because little current is behind st these charges can be discharged thro what seem to be high resistances material that does not conduct electri well for most purposes can drain a st charge away quite efficiently. Altho 100 megohms (one hundred mil ohms) of resistance might be the value substance used as an insulator in an e tronic circuit, it would allow the qu draining of a static charge.

Humidity is usually the factor determines how fast a static charg drained away. Moisture in the air o surfaces will conduct electricity slightly but can be enough to drain st charges away. If the relative humidit high, the greater amount of moistur the air will result in fewer static p lems. In fact, when the relative humi is above 50 percent, static probl almost cease to exist.

Unfortunately, no one can be gua teed that the relative humidity wil high. Mot environmental control syst tend to lower humidity: both air co tioners and heaters lower it dramati ly.

Heating air "dries" it out. As the temperature goes up, its ability to h moisture increases, but its moisture tent remains the same. Because heate can hold more moisture, it acts lik sponge and sucks moisture out of o things. That's why static is more of a p lem during winter months in the n Most air conditioning systems, as w are designed to remove moisture fro

ı make it feel more "comfortable." nmidity in an air conditioned office ɔop below 20 percent. What matters : the outside humidity, but the lity of the area in which the com- is operated.

ɔctrical conductivity also plays a n determining whether static elec- will be a problem.

the material that carries a static e is not a good conductor of electric- e charges will not be able to flow out ery well. Discharging may take sub- al time, in the form of a slow, low- e pulse instead of a lightning-like However, no static charge can build a good conductor because the es will drain off as fast as they are ated.

sizable static discharge only occurs a static charge builds up in an elec- conductor that is isolated from oth- nductors by an insulator. Because nman body is a relatively good con- r and most shoe soles are very poor uctors, people often carry substan- ttatic charges around with them, to spark out.

c Prevention

many of the conditions that generate charges or keep them from draining e removed from your PC's environ- . potential static problems will be d.

cause static is generated when dis- ar materials are rubbed together,

THE ficial word from the actory is that static protection is not necessary.

can be avoided by wearing shoe made of a material that is matched to arpet to minimize the triboelectric nce.

atic problems can also be prevented t wearing shoes. When your body is nger insulated from the floor, static es are free to drain off before they become powerful enough to zap a personal computer. Going barefoot around your home or office computer, unfortunately, might be ruled out for reasons of personal safety or professional decorum.

Anti-Static Sprays

The most common solution is to apply an anti-static spray onto the carpet of the computer room. Sprays are easy to apply and are relatively inexpensive. They are available either in individual aerosol or push-sprayer bottles. The fluid can be purchased separately for about $10 a quart.

STATIC discharges as low as 2,000 volts may cause computer problems.

These sprays are designed to make the carpeting slightly conductive. As you walk on the sprayed carpet, some of the static-inhibiting material collects on your shoes, making them triboelectrically similar to the carpet.

But sprays are only a temporary solution. The coating rubs off, and with it goes the anti-static protection. Often the first sign that the spray is no longer working is when you feel a tingling in your fingertips; by then it may be too late to save your computer from static damage.

Anti-Static Furnishings

A more permanent static preventive is anti-static carpeting. Carpets made from some synthetic materials may seem to be—or may even be advertised as—low static. Polyester and acrylic fiber carpets tend to create little static. The reason is that neolite, the most common and inexpensive material used for shoe soles today, is triboelectrically close to the synthetic fibers of the carpet. But the low-static quality of acrylic and polyester fibers cannot be depended on in every case. Someone wearing leather-soled shoes could stroll into the room and generate enough static to give himself—and the computer—a good jolt.

Computer-quality anti-static carpeting is made from special materials that have electrical conductors woven through the pile. The carpet conducts well enough to drain off the static as it is generated. Note that the resistance of the conductive strands in the carpet must be a carefully-controlled value. If the carpet does not conduct well enough, it will give little static protection. If the fibers conduct too well, the carpet would be dangerous; it could be the source of a severe shock if you accidentally touch an electrical wire or outlet. Highly-conductive carpeting, or any conductive flooring material, is as dangerous as a wet basement floor is for electrical work.

Computer-quality anti-static carpets can be quite expensive, especially if you must remove a nearly-new existing carpet to install the protective one. A less expensive alternative is to use an anti-static rug or mat.

Most anti-static rugs are woven from materials similar to those used for computer-quality carpets. They are available in a variety of colors, shapes and sizes, at prices that range from about $50 for a 3 by 5 foot rug to several hundred dollars for a larger rug.

Anti-static mats resemble the carpets protectors placed behind desks to reduce the wear caused by chair casters. Either a controlled-conductivity compound may be used for the whole mat or a conductive meshwork may be built into the mat's surface. A 2 by 3 foot mat may cost $50 to $80; a 4 by 5 foot mat could cost more than $200. Due to the properties of static electricity, a larger mat or rug offers better protection than a small one.

Because arising from a chair can generate sufficient static to play havoc with a computer system, anti-static chairs also are available. Usually they are upholstered with a fabric that has conductive fibers woven in.

A humidifier can help alleviate static problems by raising the relative humidity of the computer's environment above 50 percent. Using a humidifier in the computer-operating area has the side benefit of making the home or office more comfortable for human occupants during winter months.

If a humidifier is relied on for static protection, a hygrometer (which measures relative humidity) should be used to verify that conditions are proper. */PC*

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lo, we're all okay, but ur computer's gone."

ld have been a lot worse.
kily, all that was missing was the
uter and some spreadsheet software.
nat should be covered by insurance.
it isn't. Ed didn't realize that once he
l using his home computer on business
ts, his homeowners insurance no
r would cover it.
uddenly as the robbery had occurred,
and himself out several thousand dol-
ith no way to recover it.

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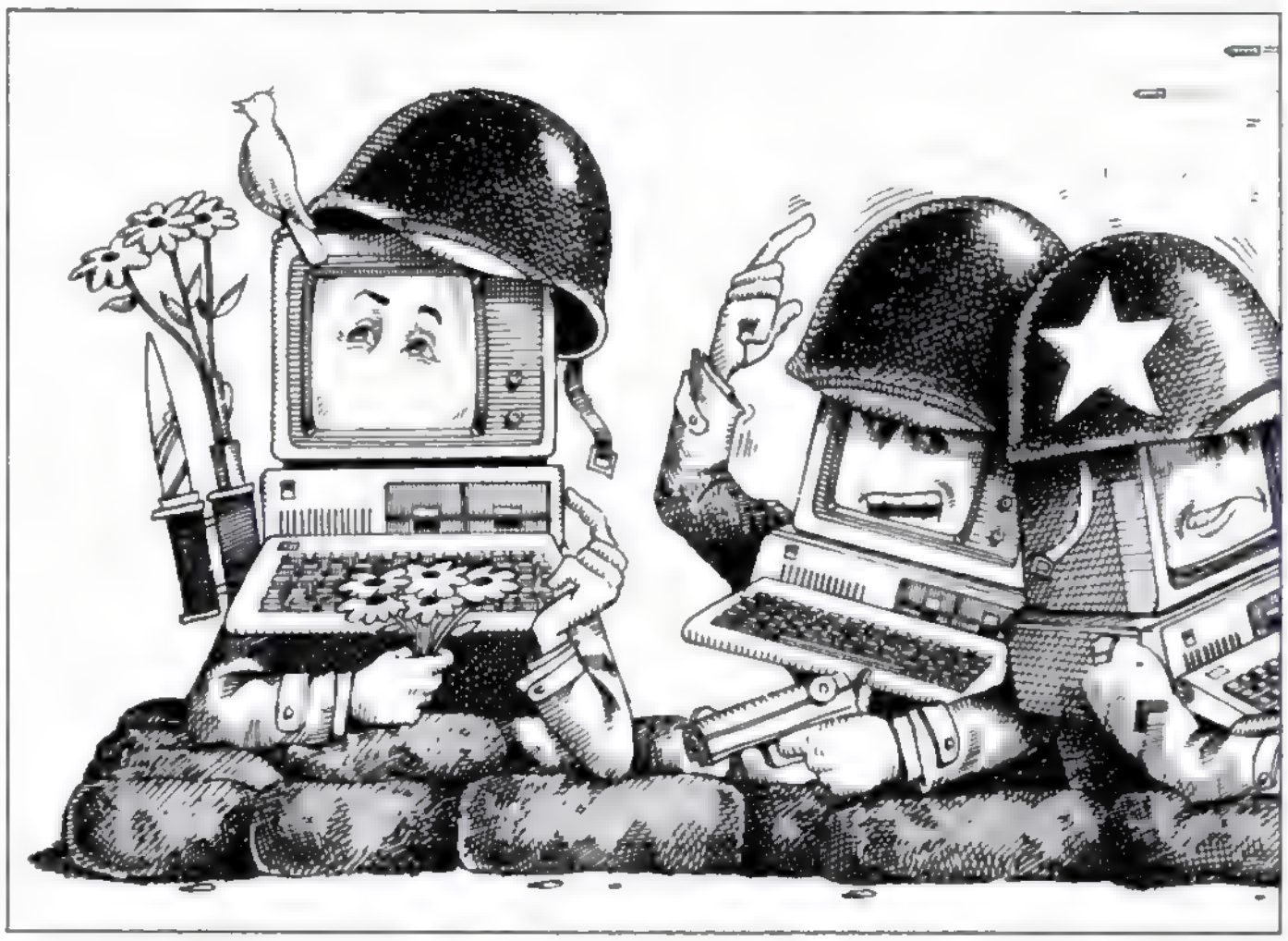
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ver the past 50 years, the insurance ess has blossomed into a huge, lwide industry. It is now possible to e virtually anything for a price. cians can buy coverage for their lips, s, and voices, and athletes pay stiff iums to insure their various limbs. o, the Personal Computer needs cov- as it moves into small businesses omes.

THE LOSS OF luable software and ta disks gives rise to me unique problems.

ther Piece of Furniture

ay computer used in the home, for ehold or hobby work, is a "home uter." Generally, home computers cluded under the property coverage portion of your homeowner's or renter's policy. The policy probably does not automatically include specific coverage for your computer, but the computer will be treated the same as any other household property, such as television sets or furniture. If it is stolen or damaged in a way that is covered by the policy, the insurance company will cover the loss. The amount paid by the company depends on the type of policy. Some policies provide for payment based on a depreciated value of the system, while others allow for replacement with like goods.

Though the homeowner's policy may adequately protect the hardware of a home computer, the loss of valuable software and data disks gives rise to some unique problems. These problems generally fall into two categories. The first of these is the problem of valuation. To reimburse an insured person for a loss, insurance companies must be able to put a value on the property in question. In the case of commercially available software, this is fairly easy. However, information that is stored on a floppy disk or a hard disk, such as a programmer's code or a writer's text, is not easily assessed. Unfortunately, in such instances, the insured will be able to recoup only the value of

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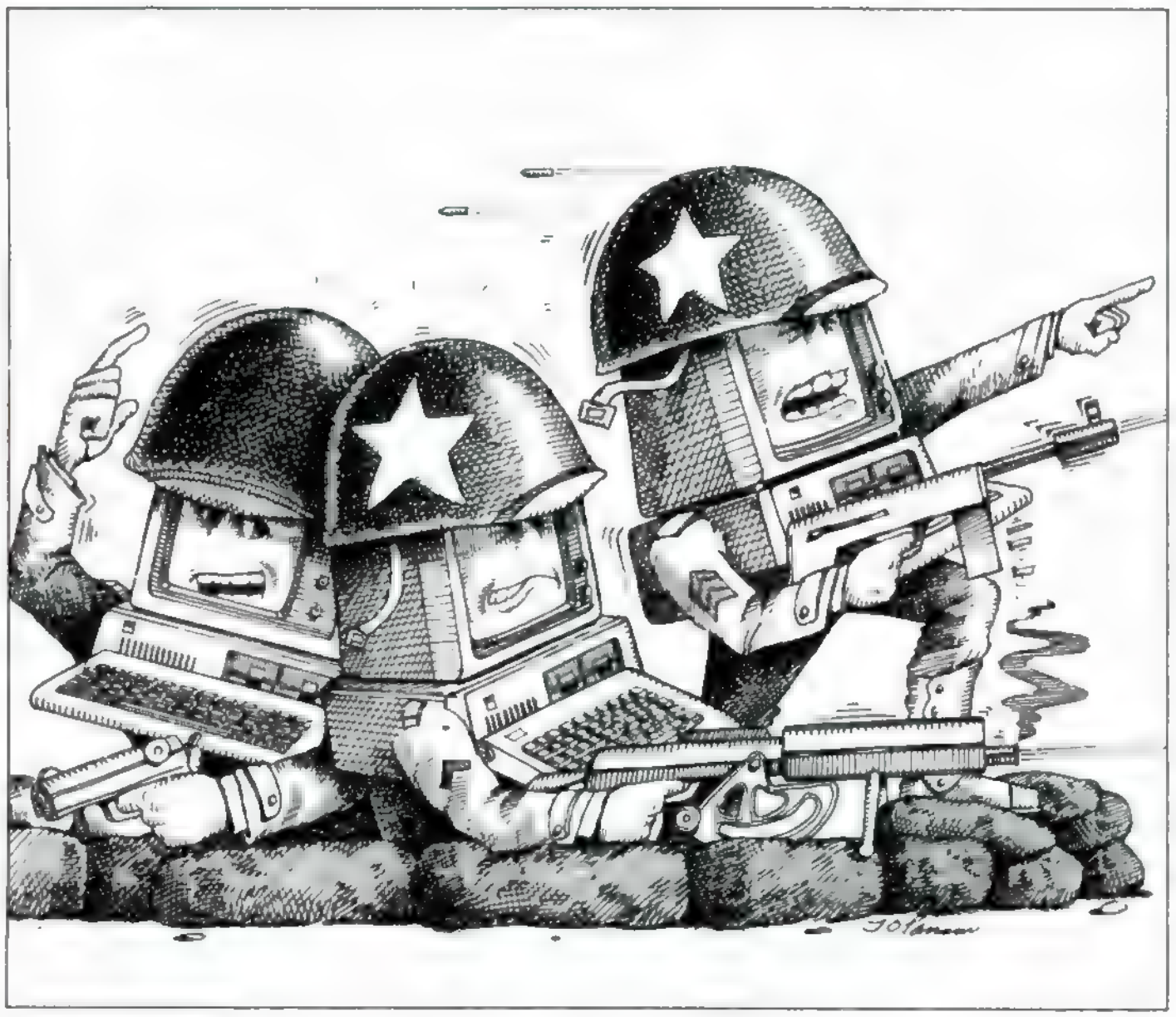
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the blank disk. This is little consolation to the novelist who hasn't been keeping hard copies and loses two full disks in a fire.

The second category of problems involves the means by which electronic data may be "destroyed." In addition to the usual destructive forces that threaten the property owner, the computer user has to be wary of such evils as magnets, direct sunlight, static electricity, and spilled beverages. Although the issue has not been widely tested, it appears that insurance companies will deny reimbursement if data is lost through these means. How, then, can you best protect your investment in both time and money?

TELL YOUR insurance agent you would like special coverage for your PC and software.

Going With a Float

Many homeowners' policies can be modified to include what is known in the industry as a "floater." Floaters are extensions of coverage incorporated into an insurance contract for specific items. For example, many people include floaters for certain pieces of jewelry. A value is declared, and an appropriate increase in the annual premium is assessed.

A few insurance companies currently have floaters especially designed for computers and software. However, the general floater form will suffice. Tell your insurance agent you would like special coverage for your PC and software. You can then set a value on your system and increase your coverage accordingly. Although the premiums will vary from company to company, the rate should be about $.70 per $100 of value.

Following these steps will result in proper insurance coverage for your home computer system. If you use your domestic PC for business purposes, different steps will have to be taken to insure it.

A Degree of Business

Often it is a matter of degree whether a computer is being used for business or home purposes. If you use your PC for some business purposes, chances ar
also use it for domestic chores. Afte
isn't this what the micro revolution
about?

If a loss occurs, and some busines
is involved, some insurance comp
will decide whether the primary u
home or business. Others will try to
rate the amount paid in the event of a

*THE ONLY WA
to fully protect agai
loss is to take
preventative measu*

In any event, business use can cause
lems when you attempt to collect un
homeowner's policy.

Insuring Your Business

A small computer used primari
business will not be covered under
normal homeowner's or renter's i
ance. This is true regardless of where
computer is located. Until recently,
business computers were covered
under the owner's general business
cy. This policy typically insures the
ness person against loss or dama
office equipment and provides cov
for general liability. Also availabl
extensions of coverage for such ite
valuable papers and employee dish
ty.

Now, however, increasing numb
insurance companies are introd
special policies for small business
puters. These new policies address
(but not all) of the unique issues inv
in insuring software and valuable
tronic data. Some companies insu
loss of profits or will pay for a temp
backup system should magnetic bus
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small business computers.

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2. IBM-PC-DOS operating system
3. Floppy or Hard disk drives

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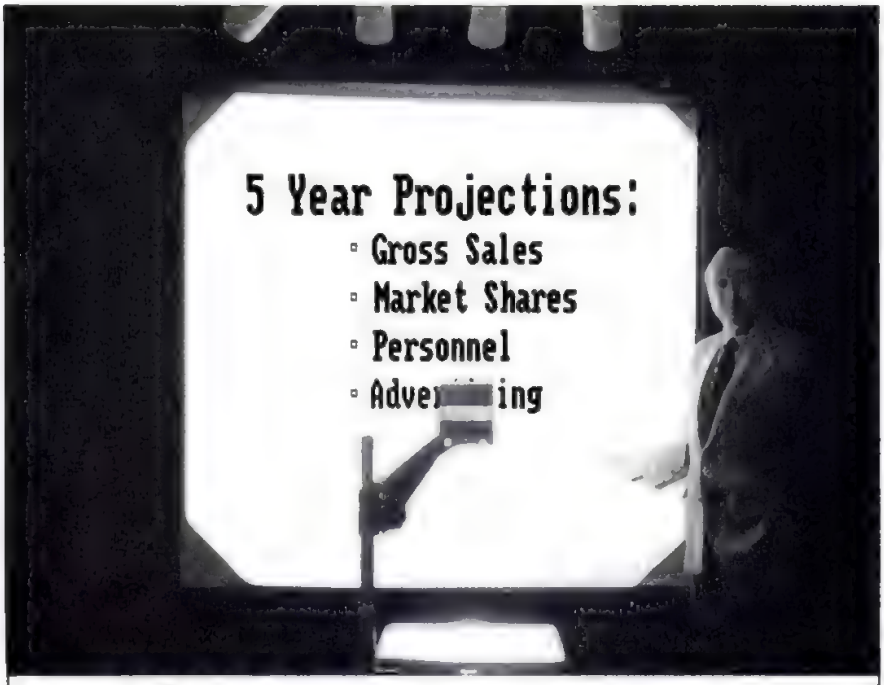
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of the company's limit of liability \$5,000, whichever is greater. Additio coverage for software can be obtai however.

Depending on the company and t of policy, certain types of losses excluded from coverage under the typ computer policy. For example, one c pany does not insure against loss cau

MOST OF US have to rely upon the time-honored institution of propert insurance.

by electrical disturbances, "myster disappearance," or dryness and da ness of atmosphere. Obviously, th risks are of great concern to comp owners. Shop around until you find policy that best suits your needs.

When insuring your computer, should get coverage that specific names the system as a covered item. In context of a homeowner's policy, means getting a floater that assigns a ue to the system (hardware and softw and provides that an additional prem be paid. The extra sum is well worth peace of mind that it buys. In the busi setting, it is best to obtain a small busi computer policy.

There is one major shortcoming computer insurance. Just as \$100 won't buy back a trombonist's fractu elbow, no amount of coverage will act ly restore your lost data if you don least have a hard copy backup. S things just can't be replaced. The way to fully protect against loss is to preventative measures. This means m ing frequent backups, installing po conditioners, generating frequent h copy printouts, and storing off-site b ups for very sensitive data.

Paul E. Remer, brother of regular PC l columnist Daniel Remer, is a partner Mountain View, California law firm specializes in computer and high t nology law.

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PL, an extremely fast and powerful language, s been used on mainframes for decades. Several rsions are beginning to appear for the PC.

APL

Programming With Funny Symbols

ur idea of a PC is simply a small beige e of office furniture that you stick r spreadsheet or word processor disks , you may find this article a bit dull. if you do any kind of mathematical or tional computation, or think that hav- access to a PC without trying your d at programming is like buying a erati with an automatic transmission using it to haul gravel, what follows astonish you.

Whether you're a beginning program- who has barely cracked the IBM IC manual, or a diehard code writer se favorite sport is error trapping, ve probably discovered what a mixed sing BASIC can be. While it is a fairly ble and versatile language, it chugs g on its way to the very bottom of y benchmark test. Its many restrictions and weaknesses have sent hordes of programmers scurrying to find other languages that are faster and more powerful.

Dream for a minute about the convenience of having a high level programming language in which data types do not require declaration in advance, maximum values for array subscripts need not be specified, arrays can be operated on directly without using nested loops, user-defined functions follow the same syntax rules as do the language's primitive functions, the hierarchy of function execution is simple, numeric and character data need not be distinguished by special symbols, and many complex mathematical and relational processes are available as single-keystroke functions. If these tickle your fancy then the computer language APL may be just what you need. Although not too well known, APL has just become available for the PC and is rapidly gaining favor.

MAXIMUM values for array subscripts need not be specified.

APLers can be found throughout the world in universities, businesses, government agencies, and public schools. Their numbers, although small, include econo-

mists, scientists, engineers, statisticians and information analysts of all types. Many APLers who cut their computing teeth on another language never looked back once they discovered APL, and tried to forget their first language as quickly and completely as possible.

ARRAYS CAN BE operated on directly without using nested loops.

My own experience is a case in point. As a graduate student in economics during the 1960s, I programmed economic models and econometric routines in FORTRAN. Several years later I began using DYNAMO and CSMP. My first exposure to APL was at the University of Alberta in 1969, but it took two more years before I finally conquered my resistance to change and started making the switch to APL. Today I look for every excuse possible to avoid using FORTRAN, BASIC, or whatever.

APL is full of built-in features not found in any other general purpose language. It can usually accomplish with a few symbols on one line what would require a dozen or so lines of code in another language. The situation is not unlike the conversion from the English to metric system of measurement. Thomas Jefferson won the battle to put the United States on a decimal monetary system, but was not successful in convincing his compatriots to adopt the metric system. We are still stuck with the English system today. Many programming tasks could be greatly simplified if written in APL; but FORTRAN, BASIC and related languages still prevail. Resistance to change is always great.

Language Origins

APL is a machine executable notation for analyzing information. The acro APL is derived from the book *A Progr ming Language* (1962) by Kenneth E. I son. This language had its origins in 1950s as a notation that Iverson de oped at Harvard University for descri solutions to linear differential equat used in an economic input-output m being constructed by Professor Wa Leontief. In 1960, Iverson joined I The language was used to describe

USER-DEFINED functions follow the same syntax rules as do the language's primitive functions.

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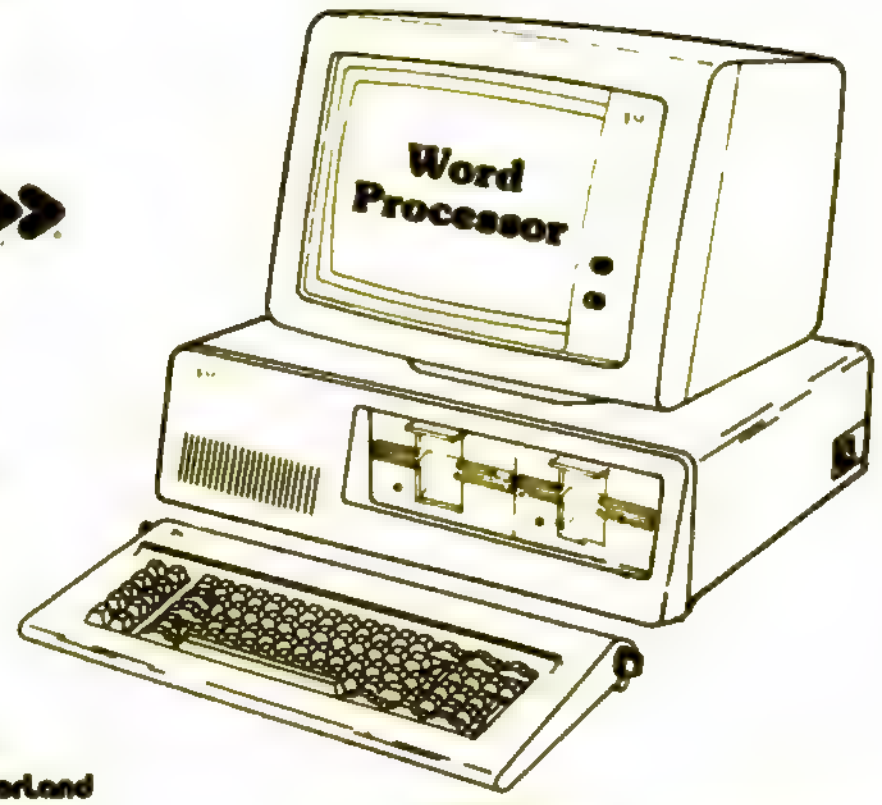
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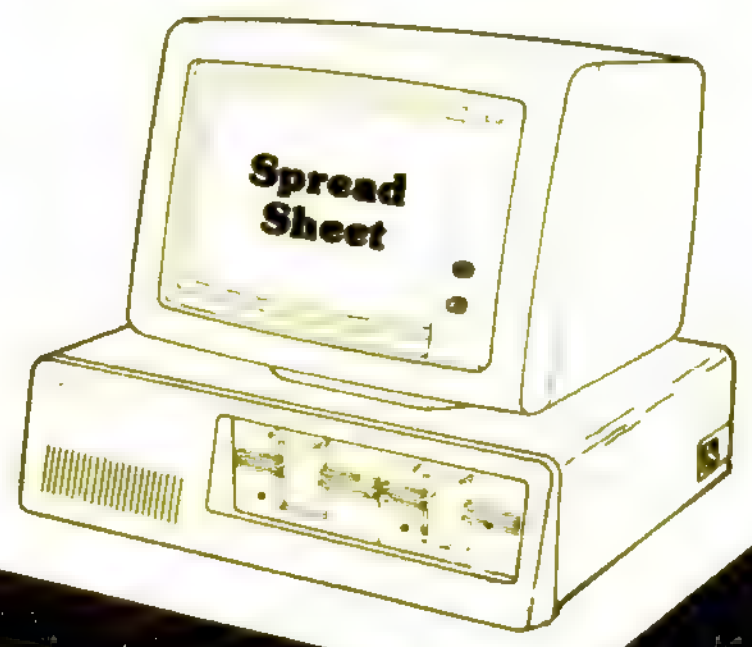
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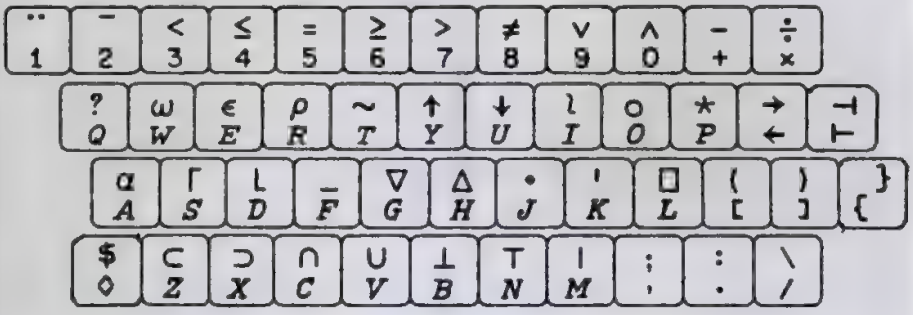
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Figure 1: The APL keyboard.



machines that later became the IBM series of computers.

Most important APL developm occurred in the mid 1960s, during th called "Period of Implementation. quick succession, a character set formed, the language was linearize type ball was developed for the IBM terminal, and by 1965 an interpret implementation was up and workin experimental version was available the IBM System/360 by the fall of and it proved to be a practical and cient computer language. By 1968, was available outside IBM.

Since its public introduction, API attracted the attention of the bus community through the efforts of time-sharing firms, I. P. Sharp Assoc Ltd. of Toronto, Canada, and a Mary company, STSC, Inc. A second grou APL enthusiasts can be found at univ ties throughout the world.

APL Fundamentals

The fundamentals of APL are de tively simple yet surprisingly powe The most noticeable difference betw APL and most other languages is its acter set (see Figure 1). The alphabet sists of an uppercase italic font ent

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from an unshifted keyboard. Nun appear in their usual positions in th row. But the positions normally occu by the capital letters are taken up new set of characters, most of whic probably unfamiliar. Symbols such − , × , + have their standard mean but symbols such as ρ, ↓, ⌷, ⌊, Δ d have any immediately obvious interp tion. Moreover, APL has an expande of symbols that are formed by overs characters, such as ▼, ▲, ⍎, ⍕. I these special characters provide a s "primitive" functions that handle a variety of arithmetic, Boolean, rati selection and structural operations.

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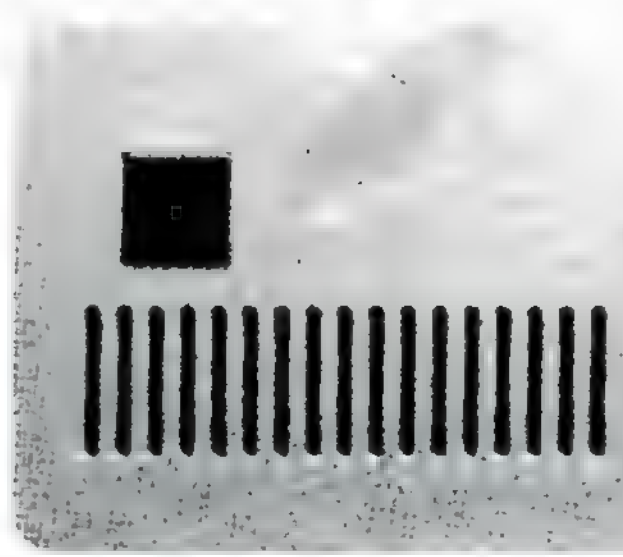
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At its simplest, APL is a fancy calculator. APL normally positions the cursor seven spaces to the right of the margin while waiting for information to be entered from the keyboard. This is illustrated in the examples below.

NUMERIC AND character data need not be distinguished by special symbols.

Let's try a few APL expressions. For example:

```
      6+8
14
      3×10
30
      2÷3
Ø.6666667
```

Familiar arithmetic operators have their usual meaning, as demonstrated above. But what about some of the other symbols? Guess what each of the following ⍳, ⌽, ⌊, APL primitive functions does:

```
      ⍳5
1 2 3 4 5
      ⍳3
1 2 3
      ⌽10 15 20
20 15 10
      ⌊5.2
5
      15⌊16
15
      15⌊14 15 16
14 15 15
```

The symbol ⍳ acts as an index generator, producing the integers from 1 to the integer appearing to its right. The overstruck symbol ⌽, composed of a circle ○ and stile ⌽, reverses the vector of numbers appearing to its right. The last three examples use the downstile symbol ⌊. With a right argument only ("monadic" fo

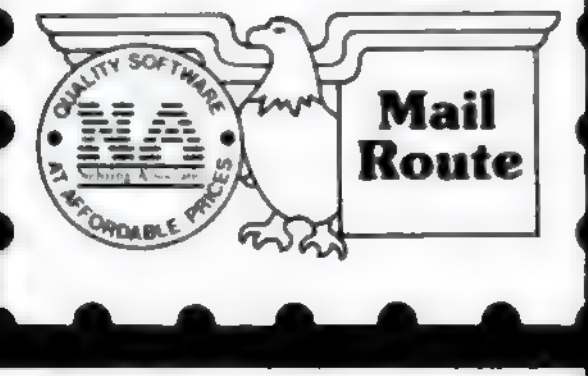
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this symbol becomes a floor operator yields the integer part of its argum When ⌊ is used with a left and right a ment ("dyadic" form), the result is minimum of the two arguments. The example shows that dyadic function APL may have arguments of diffe dimensions.

The major objects of APL are ar These may be scalars, vectors, table

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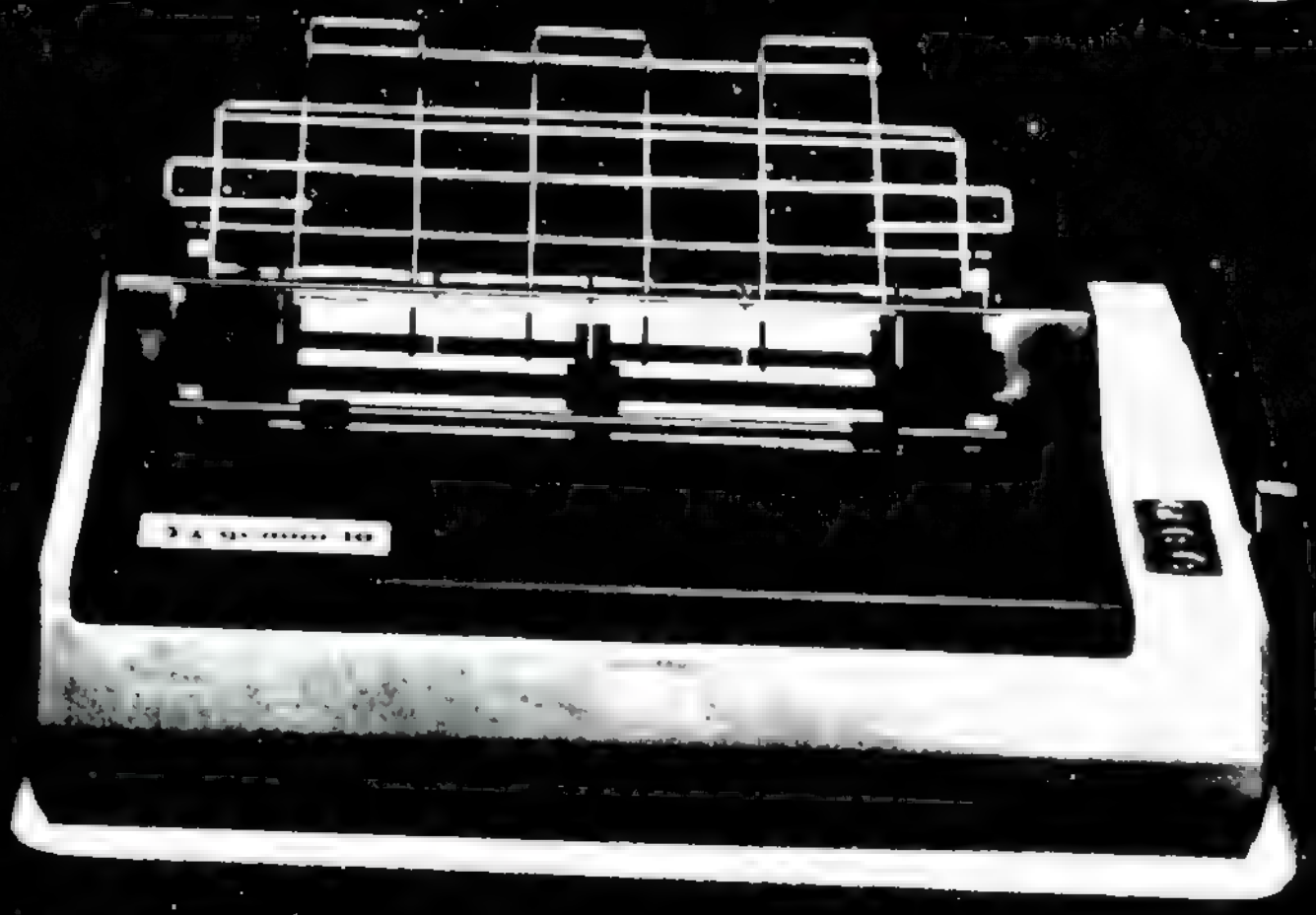
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matrices of two or more dimensions. Arrays may be composed of either numeric or alphabetic information; there are only two data types. Arrays are manipulated using APL's primitive functions.

APL IS deceptively simple yet surprisingly powerful.

There are three types of statements. A name assignment is accomplished by:

```
A←1 10 100     (a number vector)
B←'ABC'        (a character vector)
```

A branch statement is given by:

```
→10
```

A display statement is any statement without a branch or assignment format such as:

```
      A
1 10 100
      B
ABC
```

User-defined functions are also easily constructed. These functions have zero, one, or two arguments, and the syntax for their use is identical to that of primitive functions. A scalar function extends arrays to higher orders element-by-element. There is only one rule for order of execution, sometimes referred to as the "right-to-left" rule, and it applies to both primitive and defined functions. The rule is that "the right-hand argument of any function is the value of the entire expression to the right." Subject to this rule, parentheses control the order of execution in the usual way. There is no need to specify a hierarchy for function execution. The execution rule is shown by:

```
      3+5×4
23
      (3+5)×4
32
```

Most primitive scalar functions have monadic and dyadic forms. If the ...sign ÷ is used monadically, it calcul... reciprocal; used dyadically it per...

Figure 2: Specification and disp... variables for APL one-liners.

```
      A←'ABCDEFGHIJKLMNOP
STUVWXYZ'
      A
ABCDEFGHIJKLMNOPQRSTUVWX

      X←1,3 1ρ1.16 1.96 3.0
      X
1 1.16
1 1.96
1 3.09

      Y←3 1 2
      Y
3 1 2

      M←4 3ρ'BOBANNSUEDON'
      M
BOB
ANN
SUE
DON
```

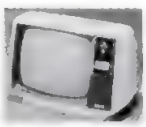

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Figure 3: *APL one-liners.*

```
AVERAGE OF VECTOR Y
     (+/Y)÷⍴,Y
2

VECTOR Y IN ASCENDING ORDER
     Y[⍋Y]
1 2 3

MEDIAN OF VECTOR Y
     .5×+/Y[(⍋Y)[⌊⍳⍴Y×.5 .5×1+⍴Y]]
2

PRIME NUMBERS UP TO INTEGER N
     N←20
     (~I∈I∘.×I)/I←1↓⍳N
2 3 5 7 11 13 17 19

ROUND MATRIX X TO P PLACES
     P←1
     (10*-P)×⌊.5+X×10*P
1 1.2
1 2
1 3.1

LINEAR REGRESSIONS OF Y ON X
     Y⌹X
2.88057004 ¯0.42539618

BINARY REPRESENTATION OF INTEGER N
     N←13
     10⊥2 2 2 2⊤N
1101

HISTOGRAM OF FREQUENCIES Y
     (' *')[1+(⍳⌈/Y)∘.≤Y]
*
* *
***

N-TH ORDER IDENTITY MATRIX
     N←3
     (⍳N)∘.=⍳N
1 0 0
0 1 0
0 0 1

ALPHABETIC SORTING A LIST OF NAMES M
     ⍎(⍕M)[⍋⍉(1+⌈/MI)⊥MI←A⍳⍕M]
ANN
BOB
DON
SUE
```

the normal division operation. These illustrated by:

```
      4÷2
2
      ÷2
0.5
      4×÷2
2
```

APL has a unique character set, m primitive functions, simple syntax ru few expressions types and an uncom cated execution rule. But APL is capa of much more than the simple calculat type expressions presented above.

APL One-Liners

One of the reasons that APL is not u versally popular is that APLers relish challenge of compressing as much as p sible into as few symbols as possible. T practice, while intellectually satisfyi produces short, often incomprehensi programs. The so-called "one-line have for many taken on the character idioms. Figure 2 specifies some typi APL variables that will be used for

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CIRCLE 502 ON READER SERVICE CARD

ine examples of Figure 3. These fications indicate the typical way in h variables are constructed in APL. v each one-liner in Figure 3 is the t using the data from Figure 2. use APL can operate directly on s, the use of loops can generally be led. It is fair to say that only a frac- of the time that would be spent ing BASIC in order to program these iners need be spent learning APL in to accomplish the same task.

r-Defined Functions

PL has adequate facilities for input output control that can be demon- d with several user-defined func- . Consider the problem of converting tor of temperatures from Celsius to nheit and vice versa. Let's begin the Fahrenheit temperatures:

```
F←¯40 32 98.6 212
F
 32 98.6 212
```

n APL function to calculate the cor- nding Celsius temperatures is defined by

```
      ∇ Z ← CEL F
[1]   ⍝ CONVERT  FAHRENHEIT  TO
        CELSIUS
[2]   Z←(F-32)×5÷9
      ∇
```

The function name in the example above is CEL. It is monadic with argument F which represents the Fahrenheit temperatures to be converted, and it returns an explicit result denoted by Z. All that

SO-CALLED "one-liners" have taken on the character of idioms.

APL requires once a function is defined is to enter its name and values for its arguments if any. For example enter:

```
      CEL 212
100
      CEL 32
0
```

Recalling that the variable F was specified above, try:

```
      CEL F
¯40 0 37 100
```

If these Celsius temperatures are to be saved in a variable of C then enter:

```
      C←CEL F
      C
¯40 0 37 100
```

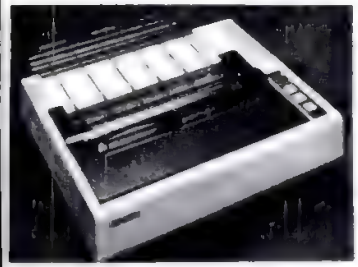
Displaying C demonstrates that the function CEL can assign values to a variable. Next, a function FAH comparable to CEL for converting Celsius to Fahrenheit can be defined as:

```
      ∇ Z ← FAH C
[1]   ⍝CONVERT CELSIUS TO
        FAHRENHEIT
[2]   Z←32+C×9÷5
      ∇
```

Finally, suppose that a function must be written that will display a table of equivalent Fahrenheit and Celsius tem-

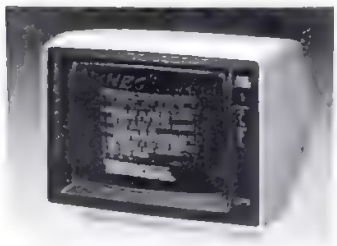
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Waterloo microAPL is one component of an extensive software package developed for the PC by Waterloo Computing Systems Limited. It follows the IBM/ACM standard for language features. The shared variable processor is not included, but a file system containing sequential and random access files is provided with APL system functions needed for communication. IBM PC color and graphics features are also supported.

The minimum system configuration to run APL is 192K RAM, one disk drive, and either the monochrome or color monitor. Watsoft's APL package sells for $295 and consists of:

- microAPL and microEDITOR disks that run under DOS
- An APL Tutorial/Reference Manual and System Overview Manual
- A 24-pin APL character-generator chip that will work either on a monochrome or color monitor
- APL keyboard stickers
- One optional APL printer EPROM (costing an additional $75)

You must have a hefty amount of memory, a slot available for the adapter board, one chip installed on the PC circuit board and another optional one in the printer. You can perform the installation yourself, but may want to seek assistance. The instructions from Watsoft are clear and easy to understand, and everything functioned as advertised.

What does all this do to your PC? The APL character-generator chip on the display adapter has the same characters as IBM's chip in positions 0-127. However, characters for codes 128-175 and 224-253 have been replaced by APL symbols.

The optional printer chip allows printing of upper and lower case ASCII symbols and all the APL characters except the underscored alphabet. You do lose the graphics symbols with codes higher than 128 unless you reset the 'SW1' switch inside the printer. This is not very convenient, however, since the printer must be dismantled to make the required change.

Thorough Documentation

The documentation for APL is very comprehensive. There is a complete tutorial section that introduces the important features of the language. The reference manual provides answers to most questions. However, the quality of printing in part of the manual is very poor. In several places, APL symbols, especially overstruck characters, are difficult or impossible to recognize.

More information could be supplied on files. If you are accustomed to using a file system with APL, there is no problem. But many mainframe APLers or new converts may have trouble. Finally, a set of utility functions should be provided to make it easier for the new APL user to get started. There is a brief appendix on "Machine Language Routines," but it is not for beginners.

I found several details of the Wa microAPL implementation disturbi

- A limitation on workspace si 56K, regardless of memory size
- No underscored characters o printer
- System commands such as and)VARS that do not alphabetize object lists
- No provision for groups)GROUP,)GRPS,)GRP
- Copying a large number of o from a workspace is very slow and consuming
- Upon leaving APL and return DOS, the BASICA command us causes a system crash

One final caution: the APL p chip available from Watsoft works IBM MX-80 printer, model 5152. newer printers now being supplie IBM (at least in California) will not with this printer chip. Watsoft can vide information about altern sources of printer chips but this n you must deal with a third-party sup Unless you like experimenting with ware, you should locate a model 5

Version 1.2, which has just released, provides substantially fast to the display and the disk. And earlier versions required the purcha specially-configured serial board does not.

In summary, Waterloo microAP first rate implementation of APL. used on a stand alone basis, it shou viewed as an educational and dev ment tool. It is not really meant to commercial application of APL. Fac are available however for communic with a host system.

ratures given a vector F or C tempera-
es but not both. Such a function is:

```
    ∇ Z ← TT TEMPTABLE T
] ⍎'TT=1 FOR CELSIUS T'
] ⍎'TT=2 FOR FAHRENHEIT T'
] →(L1,L2)[TT]
] L1:Z←7 1 ⍕T,[1.1]'FAH T'
] →L3
] L2:Z←7 1 ⍕(CEL T),[1.1]'T'
] L3:Z←('   CEL   FAH',
    [0.5]'¯'),[1]Z
    ∇
```

This function is dyadic since it con-
ns two arguments. TT stands for tem-
rature type and causes a branch in the
nction to the appropriate calculation
e. TT=1 indicates that argument T
ntains Celsius temperatures while
=2 indicates that T contains Fahren-
t temperatures. The details of TEMPT-
LE are not important but note that
ctions such as CEL and FAH may be
led from within a function. Recalling

BECAUSE APL an operate directly on rrays, the use of loops can generally be avoided.

previously defined vectors C and F
use of TEMPTABLE is illustrated by:

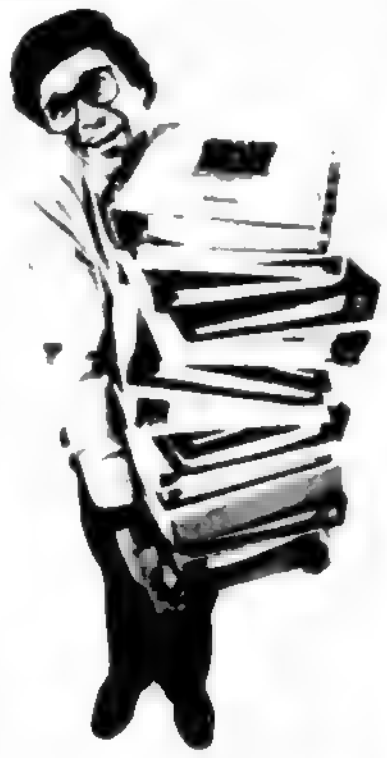
```
   1 TEMPTABLE C
 CEL   FAH
 --------
).0   ¯40.0
).0    32.0
7.0    98.6
).0   212.0

   2 TEMPTABLE F
 CEL   FAH
 --------
).0   ¯40.0
).0    32.0
7.0    98.6
).0   212.0
```

yourself how you would program the
tions CEL, FAH, and TEMPTABLE in
r favorite programming language. In
n situations, APL invariably wins,
ds down. */PC*

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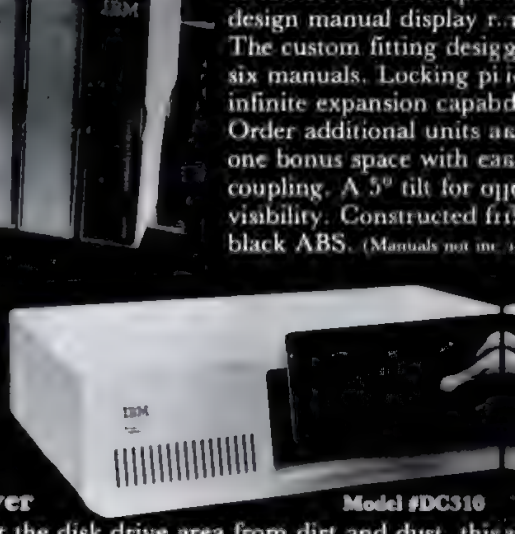
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I had used APL almost daily since the late sixties while working at IBM. When I recently bought an IBM PC to use at home, I was delighted with many of its features. The crisp monochrome monitor, for example, was a vast improvement over the clattering 2741 terminal that had dominated my Armonk office. But I was very disappointed that the PC did not support

1: *Informal comparison of APL*PLUS/PC and BASIC in counting and ating cumulative sums.*

N	LOOPCOUNT	RHO COUNT	SUMTO
1,000	18.5	0.1	0.8
3,000	55.6	0.2	2.3
5,000	92.7	0.3	3.7

APL.

Over the years I had accumulated a thick stack of APL programs and utilities that I used in my work as a communications research psychologist. These had been my everyday tools, but would not run on my PC. I was hungry to once again sink my teeth into APL.

So when PC asked me to take a look at an APL package produced by STSC, I immediately canceled a long-awaited cross-country skiing trip and closeted myself with the manuals. Skiing could wait; APL was my first programming language and an exceedingly powerful one, and I was eager to see how well it was implemented.

THE BOOKS are designed for beginners and are exceptionally well put together.

STSC, the company that produced the APL*PLUS/PC package, is the leading supplier of APL services nationwide. It was founded in 1969 as a computer time-sharing organization specializing in corporate financial management systems and other APL development services.

Headquartered in Rockville, Maryland, STSC has offices in 21 cities in the United States and Europe, and provides educational and consulting services as well as user support. The company had previously released a stand-alone APL package for the TRS-80, but its implementation for the IBM PC is far more advanced. As a result, the APL*PLUS/PC system offers much faster program execution time and runs much larger programs than previous versions.

The package includes a disk, several books and manuals, and a substitute ROM chip containing the more than 50 special APL symbols at the heart of the language. On one side of the disk are the required APL systems files; turn it over and you find several demos and utilities. STSC provides the user with two excellent books on the APL language, and a fat 3-

*Figure 2: Comparison of APL*PLUS/PC and BASIC in computing the mean, standard deviation, maximum and minimum of a series of numbers in floating point.*

Number of Numbers	Number of Seconds to Execute: BASIC	APL	Difference Factor
100	5.3	0.7	8
500	17.5	2.9	6
1,000	32.9	5.7	6
5,000	156.6	29.1	5

*Figure 3: Comparison of APL*PLUS/PC and BASIC in sorting a series of numbers.*

Number of Numbers	Number of Seconds to Execute: BASIC	APL	Difference Factor
100	20	0.3	67
200	44	0.6	73
500	120	1.2	100

Figure 4: APL Programs Used In The informal time tests above.

```
     ∇ LOOPCOUNT N
[1]  ⍝ COUNTS TO N USING LOOP
[2]    C←∅
[3]    START:→(N=C←C+1)/END
[4]    →START
[5]    END:'DONE'
[6]  ∇

     ∇ RHOCOUNT N
[1]  ⍴N⍴1 ⍝ CREATES VECTOR OF N 1S THEN GIVES VECTOR SIZE
[2]  ∇

     ∇ SUMTO N
[1]    SUM OF NUMBERS FROM 1 TO N
[2]    +/⍳N
[3]  ∇
```

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ring binder explaining its particular implementation. The books are designed for beginners and are exceptionally well put together. The manual is aimed at experienced APLers, and is not up to the standards of the rest of the package.

Under The Hood

This weakness becomes apparent as soon as you begin to install the new ROM. Installation instructions are buried at the back of an appendix. The manual tells you to look for the character chip you are to replace by examining the tiny numbers stamped on otherwise identical chips under the hood. In my PC, many of the ROM chips had blurred or missing ID numbers, and I had to start pulling out boards to examine them all. There were no diagrams, and the directions were ly confusing. After half an hour of zling over which chip to remove, I ca the Rockville office, where I rece prompt, gracious help. It turned out the chip I was looking for was on monochrome adaptor board and not mother board itself. They admitted others had complained about t instructions.

STSC IS the leading supplier of APL services nationwide.

However, once I found the locatio the ROM, installation was a snap. haps I should have known better, but not make it easy for people and be about such things in the first place?

DEVOTEES OF APL claim that user can develop APL programs four to ten times faster in APL than in FORTRAN o BASIC.

I was concerned that the subst character set in ROM would turn my into an APL-only machine. Would able to use *EasyWriter* to write this cle? Would this prevent my two s David and Daniel, from playing *Deco lon*? Would I still be able to use BAS booted up APL with bated breath.

Everything worked perfectly. The cial APL characters replace only the obscure and least needed character the IBM set. You lose the four pla card suits and other low-demand ch ters such as the lower case y wit umlaut above it. You still have 256 c acters, including upper- and lower alphabets; virtually all of the French, man, and Spanish special characters all the punctuation you could want. 96 ASCII characters and the 48 line d ing symbols are not altered.

The package will work on any pr normally supported by the PC. How you will need Graftrax or its equiva on your Epson/IBM printer to print the APL symbols. And there is no p lem with ordinary text; you can print

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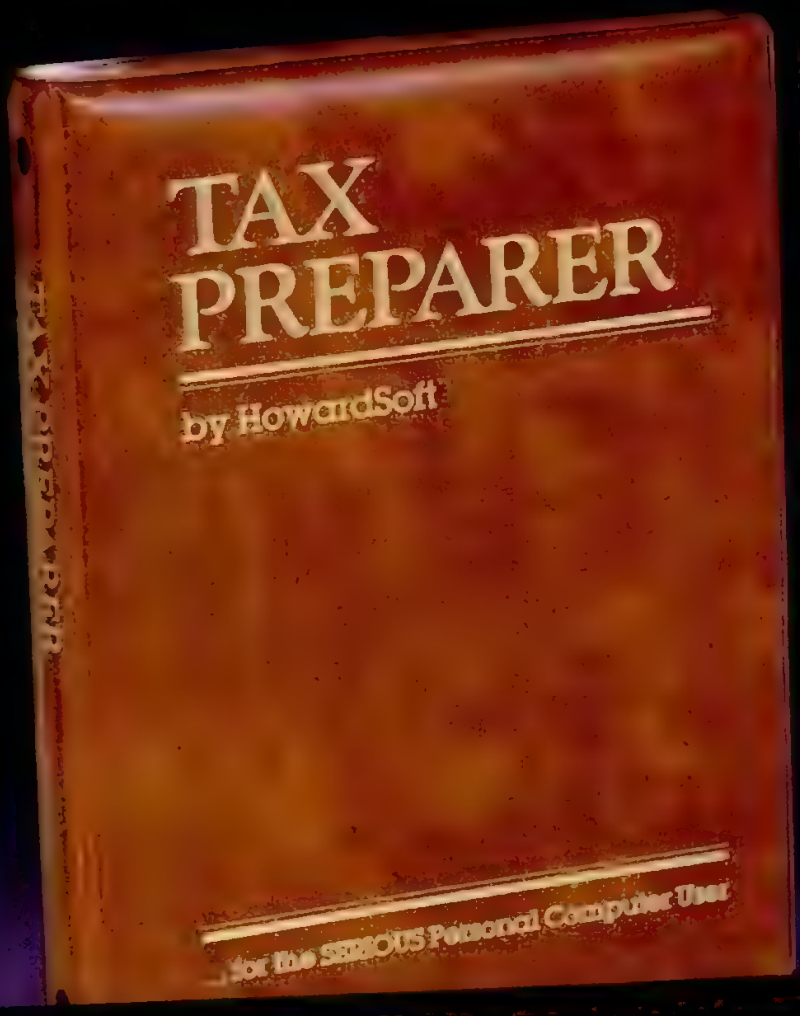
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g you could before you started using

PL*PLUS/PC runs under DOS, and systems fully reside in memory. As akes up 90K, however, the minimum m requirement is 128K. The system load any DOS files from within APL, h lets you pull in VisiCalc tables, for nple, then manipulate the data in and send the revised tables back to disk or to a remote location in Visi- form. And it allows the PC to func- either as a dumb or a very smart ter- l. It even enables you to download onto your screen from a remote e via modem and then pull this rmation off the screen into memory.

nking Mathematically

ather than just a computing lan- e, APL, which stands for *A Program-*

THE PL*PLUS/PC system offers much faster ogram execution time nd runs much larger ograms than previous versions.

Language, is an algorithmically-ori- mathematical notation system that the user and computer can under- . When you learn BASIC or Pascal learn a computer language. When earn APL you learn a language that and the computer share. And, not lly, you learn a language that helps hink mathematically.

ogramming in APL makes use of a number of special symbols. Some of such as + or − or × or ÷ are used onventional way. However, most of PL operators provide powerful func- not normally available. For in- e, the symbols ⍋ and ⍒ are used to ⌈ and ⌊ to find the maximum and mum, +/ and +\ to do sums and lative sums, and ⌹ for matrix divi- o solve simultaneous equations giv- et of variables on one side and coef-

ONCE I found the location of the ROM, installation was a snap.

ficients on the other. Other symbols allow indexing, searching, and various relational operations.

These various "primitive" functions are extremely powerful tools that allow you to write programs using extremely concise code. Devotees of APL claim that users can develop APL programs four to ten times faster in APL than in FORTRAN or BASIC.

When I first began working with computers in 1953 for a series of research studies at NYU on teenage drug use, I wanted to include advanced multivariate analyses using six 75 × 75 matrices, and commissioned IBM to write a program that would do it. It took IBM a *full year* and cost $1,500 (remember, this was 30 years ago). The same program in APL can

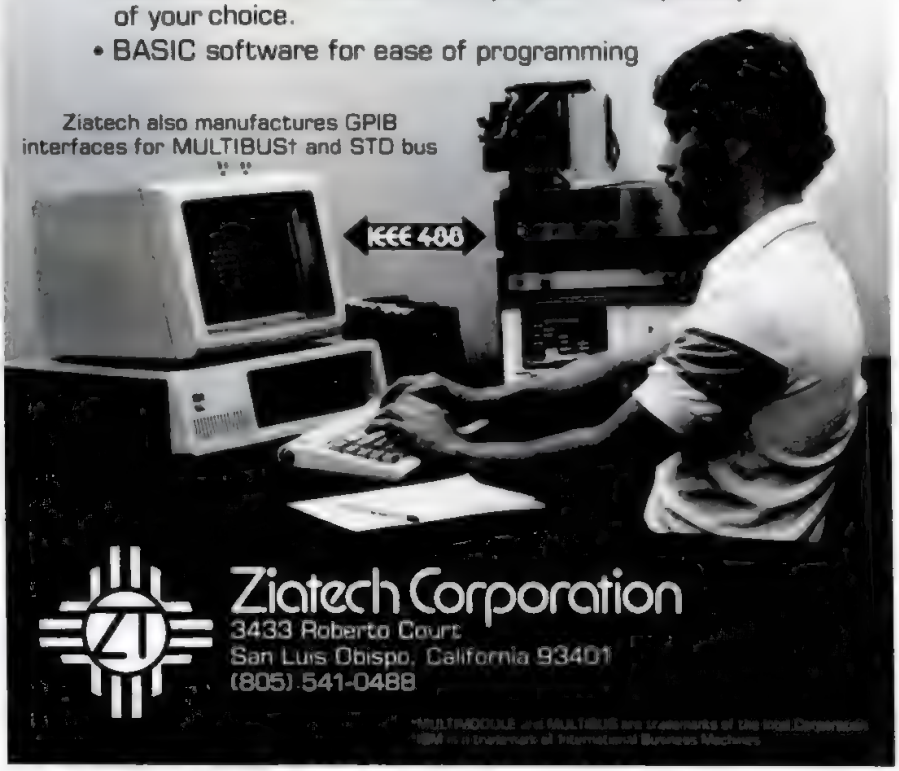
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be written in *one line*:

```
      ∇R←X CORR Y
[1]     R←AVG(STD X)×STD Y
      ∇
```

This program is set up as a user-defined function that takes both a left and a right argument, and yields an explicit result that can be displayed, stored, or incorporated into other functions. It uses the functions AVG and STD, which must be in your active workspace. APL is ideally suited for such modular programming.

Short And Sweet

Because APL allows you to be concise, APL programs are generally very short.

WHEN YOU learn APL you learn a language that you and the computer share.

There was a story going around the Yorktown Heights Research Center years ago that the original programming for a BASIC was written in one day t APL.

APL*PLUS/PC gives you an a workspace of about 41K with a 128K tem. If you have a 512K system, the v space increases to 420K. Stored v spaces, each with its own user-sup name, are available from library dis

While STSC recommends usin 8087 co-processor, my impression is this would be necessary for unus large number-crunching jobs only. without the co-processor, APL is im sively fast.

Before I received a promised s benchmark results from STSC, I formed several informal tests of my (see Figure 1). The first looked at c ing, which can be done two way APL—by a loop, as is also done in BA or by creating a "vector" of a certain ber of 1s and then using the shape tion ρ, which returns the size of an a Looping from 1 to 5,000 took 92.7 onds, while the vector method to mere 0.3 seconds. Keep in mind that ing is seldom needed in APL.

In a second informal test, I calcu the cumulative sum of all the int

EXPERIENCED APLers will be happ to hear that APL*PLUS/PC is a v complete implementation of t language.

from 1 to 5,000. Here I used the ex sion +/⍳N, which creates a vector o gressive whole numbers from one and then sums the numbers in the v APL*PLUS/PC sprinted through integers in 3.7 seconds.

You can perform many operatio APL without writing a full-blown gram by using its "immediate exec mode." APL*PLUS/PC turns your PC what is probably the world's most po ful stand-alone desk calculator.

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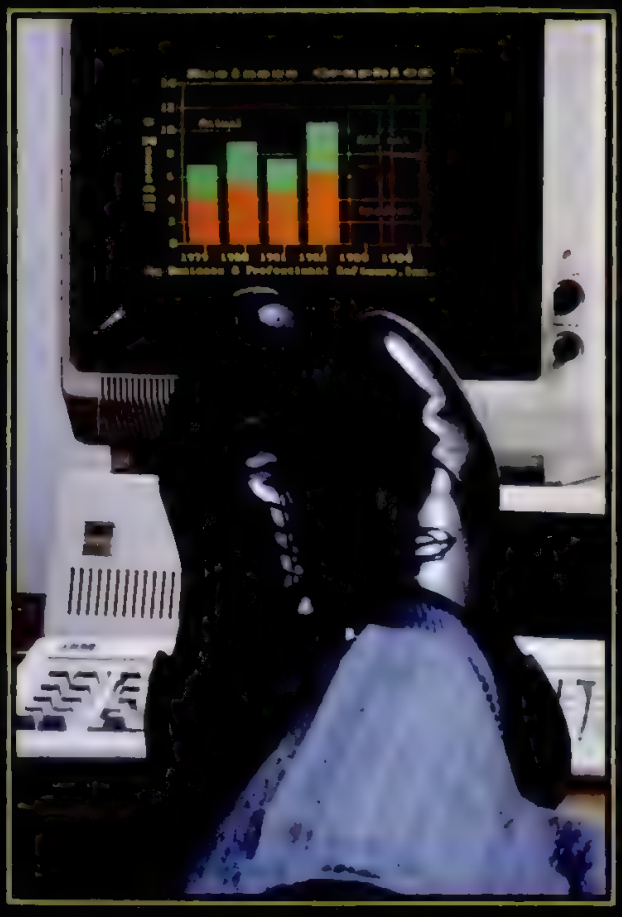
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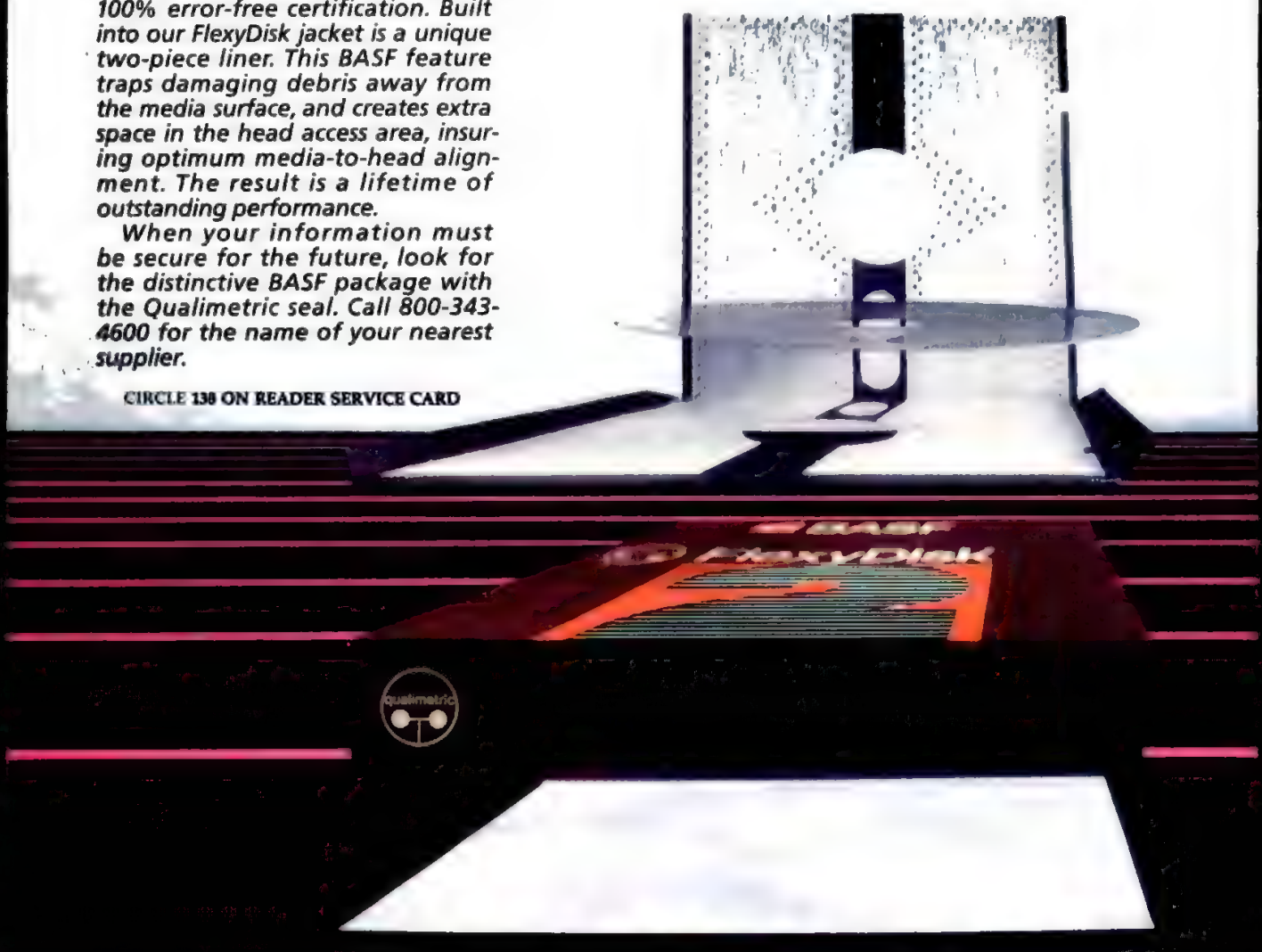
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L-Pie Order

ich Paulson at STSC sent me the lts of several benchmark tests he and olleagues performed to compare APL ASIC on a PC without an 8087. He sured trapped elapsed time without ing. Figure 2 shows the results for loping the mean, standard deviation, imum and minimum of a series of N ng point numbers. BASIC chugged gh in 156.6 seconds, while *PLUS/PC took 29.1.

igure 3 compares APL and BASIC in ng three series of numbers. STSC the Quick Sort from Dwyer and hfield's *BASIC and the Personal puter*, which is reputed to be the fas- sorting routine available in BASIC. re 4 shows the APL programs I used rt the numbers. It took BASIC 120 nds to sort 500 numbers. APL*PLUS/ mply blew BASIC away by arranging 00 in perfect order in only 1.2 sec-

IT ALLOWS the PC to function either as a dumb or a very smart terminal.

There are dozens more primitive operators in APL than BASIC. These operate on entire arrays simultaneously without requiring time-consuming loops. This applies to multidimensional matrices as well as scalars and vectors.

APL automatically stores values from −32,678 to 32,767 as whole numbers. If one element of an array is not an integer, the entire array is converted to floating point numbers. Results are normally printed to 10 significant digits, but can be displayed in up to 16.

Lines of code can be given mnemonic labels that remain constant during renumbering. This is very useful in GOTO situations and in the few cases when you need to loop. Line numbering is simple and efficient; to add a line between [1]

FORMER BASIC sers often grow a bit rhapsodic when describing some of APL's most useful features.

. Here again APL doesn't need a pro- . It can do the sort in two short steps mediate execution mode. The raw bers are entered as a vector and ned the name A. Then the upgrade itive is used by entering A[⍋A], and st before you take your finger off the key, the entire sort is done.

ormer BASIC users often grow a bit sodic when describing some of APL's useful features, and with good rea- It is crammed to the gunwales with ies that make BASIC look like a

rrays in APL do not have to be red, as no storage need be allocated vance. Arrays of two or more dimen- are defined when first used in a pro- and can be easily reshaped at any under program control.

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and [2] you simply use [1.1]. To insert a line between [1] and [1.1] you use [1.01] and so on. These are automatically renumbered into integers when the program is completed. In program listings, comments are labeled and automatically offset one space to the left for easier reading. Variable names can be up to 77 characters long. The names for character strings and numerical variables do not have to be distinguished.

Errors Made Easy

When a program bombs out, APL not only gives the error message and prints the program line, but points to the exact location where the problem was encountered. BASIC users often have to puzzle this out for themselves.

THE MANUAL could stand improvement, especially for beginners.

Users can be assigned different p word numbers for security or accoun purposes. There are many other secu features, such as locked functions and automatic expunging or modificatio workspaces if someone other than specified user loads it.

Experienced APLers will be happ hear that APL*PLUS/PC is a very c plete implementation of the language the APL operators are included, and t is a number of significant STSC enha ments. Among these are its shared system, the availability of over 100 tems functions, a powerful forma and exceptions handling capacity, the ability to create and use onscreen dows.

THE "primitive" function are very powerful too that allow you to wr programs using extremely concise co

The package does have several s comings. As mentioned above, the m al could stand improvement, espec for beginners. In addition to the prob had installing the chip, I couldn't any information on how to assign defined entry sequences to the 30 able function keys. I eventually lea that this is covered on the reverse si the disk, but there is no explanation manual of what is on the disk.

The manual is also short on inde A large section on the more than 100 tems functions has no separate tab contents. And there is almost nothi the manual on APL's powerful fo function.

Alien Strokes

STSC does provide a sturdy lami guide to the keyboard's new confi tion of Shift, Alt, and Ctrl key funct But perhaps it should make available of covers to fit over the actual keys beginners, using these alien keyst can be an extremely slow process.

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should also issue a handy reference guide listing the operation and function of these keys.

STSC seems committed to publishing the most comprehensive APL package on the market. Enchancements are issued regularly, and are offered to users at a nominal charge. Future releases are expected to include a *keyword* version based on English words rather than APL symbols, for users who do not want to install the character chip or deal with the alphabet of symbols. STSC is also working on a Help command that will provide on-line programming assistance.

APL IS NOT simply an expensive calculator.

STSC has a stated policy that there will be nothing that BASIC can do that APL*PLUS/PC cannot do equally well. Music and color graphics functions and routines are scheduled to become a part of the system, and the entire kit will soon boxed and sized to resemble IB manuals.

Under consideration for later rele are a financial planning system w spreadsheet capability, a graphics plotting package that will also includ screen management system, and a c file management interface system users who know nothing about APL. inexpensive statistical program may s be issued. Software writers will be gla hear that STSC will soon put a run-t version of APL on the market for appl tion development. While applicati with this system will run under APL, users will not have access to the langu itself.

The existing APL community may swarm to APL*PLUS/PC like bees to h ey. The system should also appeal to entists, engineers, actuaries, mathem cians, statisticians, finance experts, anyone else who wants an extremely

MANY USERS feel APL is the most advanced general purpose computer programming languag available today.

and powerful computational capabili his fingertips.

But APL is not simply an expen calculator. Many users feel it is the advanced general purpose computer gramming language available today. gramming in APL is easy to learn; enough guidance, most APL begin can function productively after one sion with it. And the educational m rials provided by STSC are excel

My own personal reaction was on awe and delight. Even without an co-processor, APL*PLUS/PC t formed my PC into a lightning-fast p erhouse. STSC is to be congratulate its sterling implementation; APL*PL PC is a major accomplishment that influence the future of microcomput

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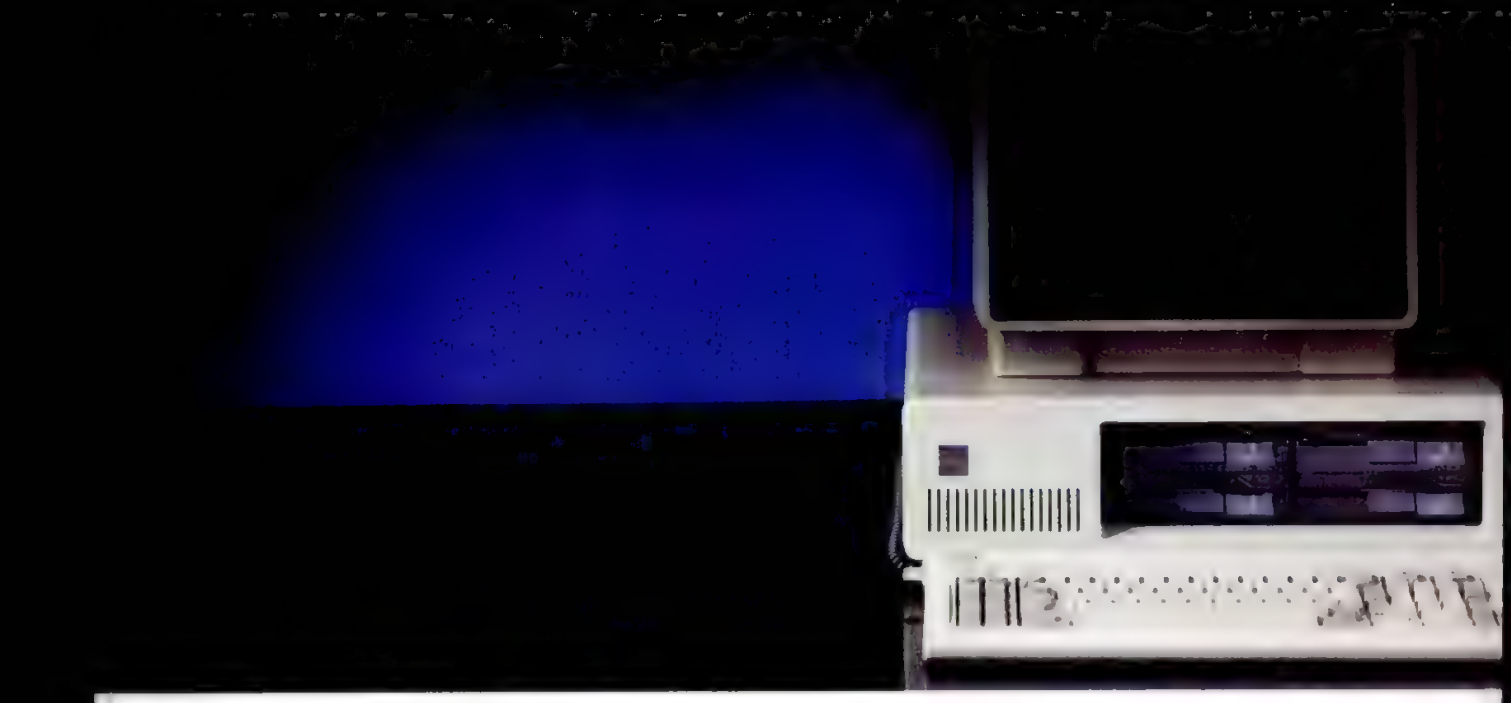
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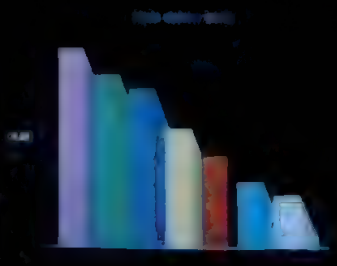
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1-2-3 is a new integrated software package that was released by Lotus Development Corporation in February 1982. It created a lot of interest when it was released at the Fall 1982 Comdex computer show.

The most controversial thing about 1-2-3 is its logo. The reverse-image design can trick your eyes if it's not reproduced or printed with the proper shading; the logo then looks like a phrase written in Arabic script. But despite its sometimes misunderstood nature, this logo symbolizes a product with a new combination of capabilities. The functions integrated in



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1-2-3 and its reasonable price are presenting a real challenge to the established leaders in the 'Calc software market.

Counting the Ways

1-2-3 is first a spreadsheet. All of its other functions rely on its spreadsheet format. As a spreadsheet, it is excellent. The program can hold up to 440K of data. It integrates a large library of functions such as present value, future value, amount of payment, statistical formulas, and logical comparisons. The spreadsheet can be designed with two separately scrolling windows, global and special labels, and write-protected cells. The width of each column can be separately defined. 1-2-3 compares favorably with any other spreadsheet on the market, but the spreadsheet functions alone are less than one-third of the program.

THE spreadsheet can be treated as a visual database.

1-2-3 adds the power of a database management system to its spreadsheet's number manipulation capabilities. Under this function, the spreadsheet can be treated as a visual database. The horizontal rows in the spreadsheet become database records. The vertical columns become the key fields. The software can manipulate up to 2,000 records with 256 fields if your system has sufficient RAM.

In this information management mode, the program can sort the records (rows) using one or two fields (columns) as keys in logical And/Or combinations. It can find and extract records with specific characteristics and can display or print portions selected from the original records.

This clever combination of a spreadsheet and a visual database provides power, flexibility, and ease of use; on top of this, Lotus decided to add one more feature to really catch your eye. 1-2-3 also includes a graphics program that is al take data that has been created by spreadsheet and manipulated by the base manager and display it as charts graphs on a plotter or graphic print

Lotus does not claim to have incl a word processor in 1-2-3, but it cert can function like one. The spread entry mode allows you to type text out being confined to the size o spreadsheet cells. You have to wato line width and perform line feeds to down a row, but text entry and mani tion is very easy.

Simple editing commands and spreadsheet copy and move comm will work as well with text as the with data. The printing commands vide all of the desired features su headers, footers, and page numb These capabilities will at least allow to easily include text descriptions your spreadsheets. If 1-2-3 is the only gram you own, you can write a grea before feeling the need to use a sophisticated word processing prog

Each one of the three major func in 1-2-3—spreadsheet, database man and graphics—has the quality of an vidual software package that coul for close to 1-2-3's total $495 retail tag. However, the combination of functions doesn't tell the whole st what this program provides. It is si cant that the biggest file on the 1-2-

THE spreadsheet's entry mode allows you t type text without be confined to the size the spreadsheet cell

tribution disk isn't a program so mu a huge collection of Help and explan statements that are ready to take the of the user. These aids are combined a flexible command format to make easy and pleasant for both novice experts to use.

The Lotus package includes a

erlay that fits nicely on the PC special nction keys. It describes the functions each key. This provides a fast source of lp to supplement the command de-riptions that appear on the screen above e spreadsheet and the Help screens.

Now that you have an overview of the nctions included in *1-2-3*, let's see how e pieces fit together.

edication to the PC

1-2-3 is not a warmed-over program at could be run just as effectively on an bit microcomputer system. It is written assembly language especially for the M PC and it takes full advantage of the 88 processor to provide very fast per-rmance.

The program can use up to 440K of AM for worksheet storage and opera-

A HUGE collection of Help and explanation statements is ready to take the hand of the user.

n. It requires a minimum of 128K and o double-sided disk drives to run. It es the special function keys and the Alt pability of the PC keyboard. The special yboard overlay is another sign of the rk done to integrate the software with e IBM PC.

1-2-3 will function with a PC equipped th the monochrome board, but it can-t display charts and graphs before they created on paper. Only systems that e the color/graphics adapter can dis-y charts and graphs before they are t to a printer or plotter.

An impressive feature of the program he ability to distribute its video output en run on a system equipped with both monochrome and color/graphics ards. A monochrome screen can dis-y the spreadsheet while the graphics nitor is displaying a chart or graph cre-d from the spreadsheet. Then, like a gician, whenever you change the data he spreadsheet, the program will make immediate change in the graph. I pre-

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dict that this data-graphing capab with immediate feedback is going to s lot of color/graphics boards and mon because 1-2-3 makes impressive us responsive computer power.

This package does not allow diffe sections of the spreadsheet to be played in color. Use of color is limite the charts and graphs.

WHENEVER you change the data the spreadsheet, the program will make a immediate change in graph.

This means that the use of a hard system can benefit program opera However, the program certainly perf ed very well on a system with two 3 disk drives.

The program makes good use of cursor to designate both commands data cells for action. It is designed to the arrow keys on the keyboard to co the cursor, but this method of co makes it difficult to use the keys on number pad to enter data. After you the program for a while, you can't but wish that someone would integr mouse with 1-2-3. Using a mouse se natural both because it would com ment the program's design and w eliminate the need to make double u the PC keypad. Mouse breeders, are listening?

Spreadsheet Commands

Software designers perpetually the problem of meeting the needs of novice and expert users. Novices sh be provided with menus to guide actions and to allow them to back-off an improper step and try again. Exp however, want to use single key mands or special function keys to m through the program as quickly smoothly as possible. They have no of menus and consider them a barri responsive use of the program. authors of 1-2-3 understand the nee

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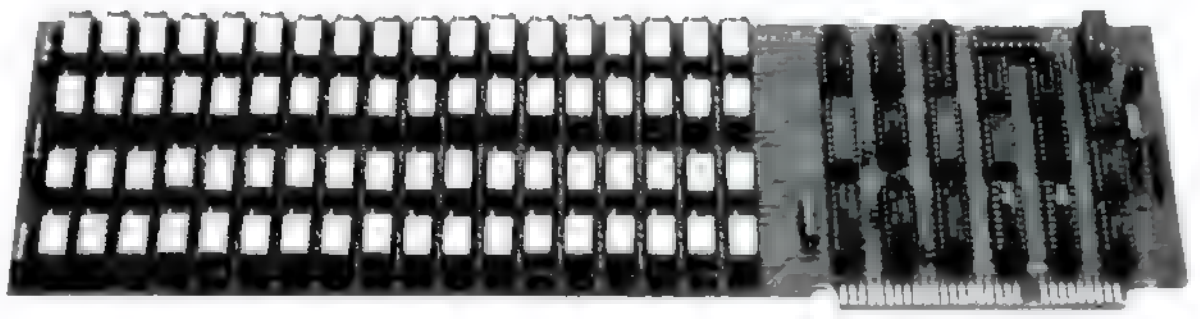
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users in both positions and built alter
tives into the program that can sati
everyone.

Almost all of the 1-2-3 spreadsh
commands are familiar to users of pres
'Calc programs. When you key in
command sign (/), the program displa
list of command words above the h
zontal bar of the spreadsheet. 1-2-3 is
ferent because the commands can
addressed in two ways.

If you are familiar with the comma
you can simply enter the first letter in
name of the command function you w
and the program will do your bidding
you are not familiar with the comma
you can move a reverse video cursor
each command word and a one sente
description of the command or the a
ciated sub-commands will appear on
second line of the screen. When you p
tion the cursor on the command
want, you only need to hit the Return
to call it in. After you have selecte
function, by pressing the F1 key, you
bring up an appropriate Help screen f
the more than 2,000 special screens
are a part of 1-2-3.

This combination of menu-driven
command-driven operation is equ
pleasing to new and experienced us
You can mix the two methods of op
tion in a series of commands. You
enter a single letter to get to the first
eral functional area you want; once
are there, you can examine each optio

ADDING a mouse would free th keypad to be used exclusively for enterin numbers.

the sub-menu and select your choice
the moving cursor. I quickly learned
few command letters I used most
quently, but I still used the menus
cursor to select some functions even
I was quite familiar with other parts o
program.

A strong feature of 1-2-3 is the ab
to access disk and file commands wit
exiting the program. You can review

ctory of a disk and even erase and me files. This is a real salvation when have created a large spreadsheet and find that there isn't enough space on file disk to save it. 1-2-3 allows you to the disk commands to find or create space without first dumping the e program.

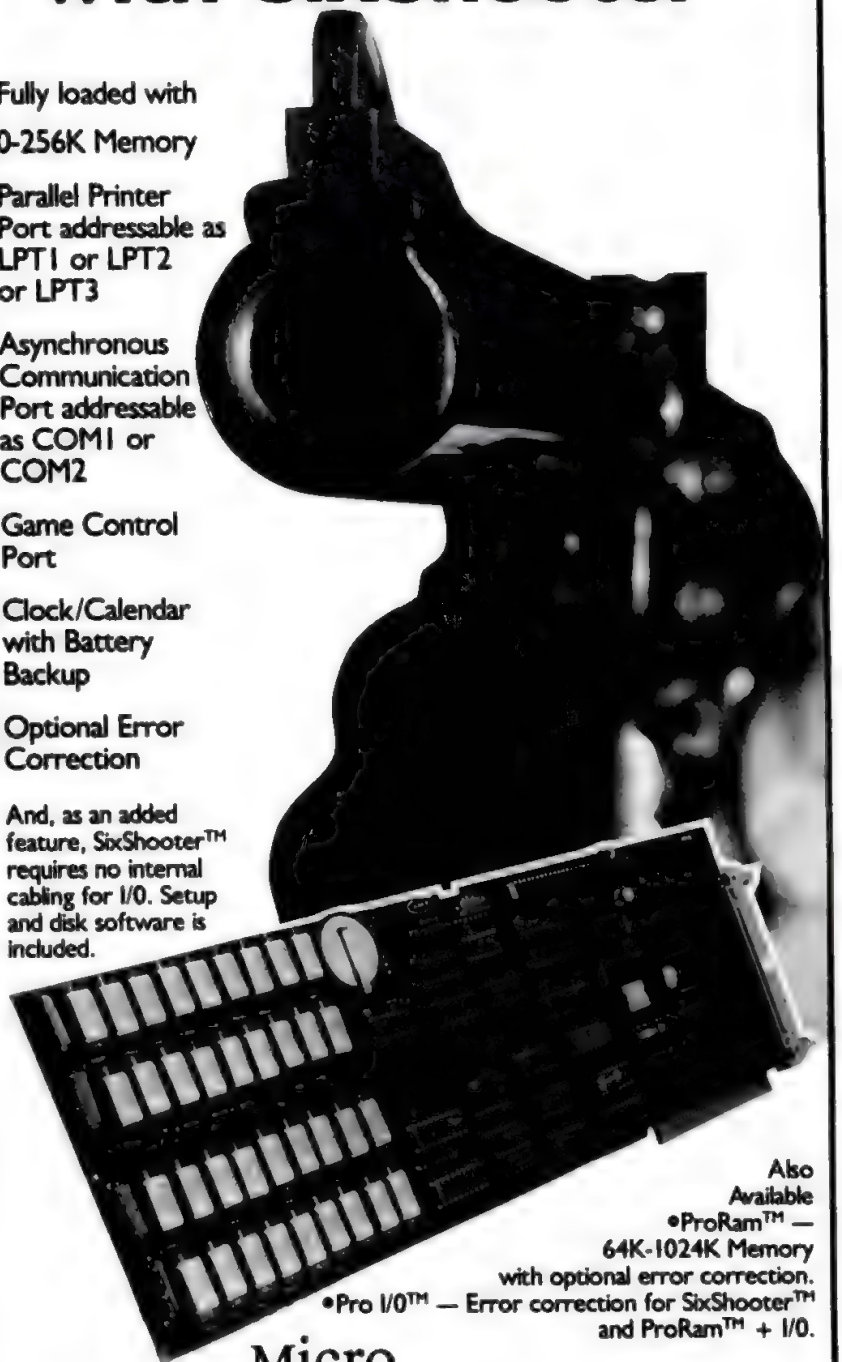
THIS ombination of menu driven and command driven operation is ually pleasing to new nd experienced users.

nother feature is the ability to create oard macros. When used with the Alt any of the 26 letter keys can hold for-as, special commands (such as return specific cell location), or any other strings that you might use frequent-his macro capability, combined with of the function keys, makes 1-2-3 a fast and useful tool for programming ific applications.

Many spreadsheet programs make a production out of using the replicate mand. Lotus has simplified this com-d considerably. Each time you dupli-a formula with most spreadsheets, must decide if each part of a formula n absolute factor, which is always regardless of the physical position of formula, or a relative factor, which is ied according to the position of the ula. 1-2-3 asks you to make these sions only once when the formula is developed. Any replication will be istent with the initial decision: abso-addresses are retained while variable esses are changed to match their new ion. This approach greatly simplifies action that requires the greatest space xplain in the manuals of most *'Calc* rams.

keeping with its philosophy of ing a dual approach to commands, 1-provides two ways to designate cells plication, movement, or inclusion in mula. The first approach, found in spreadsheets, is to use cell designa-

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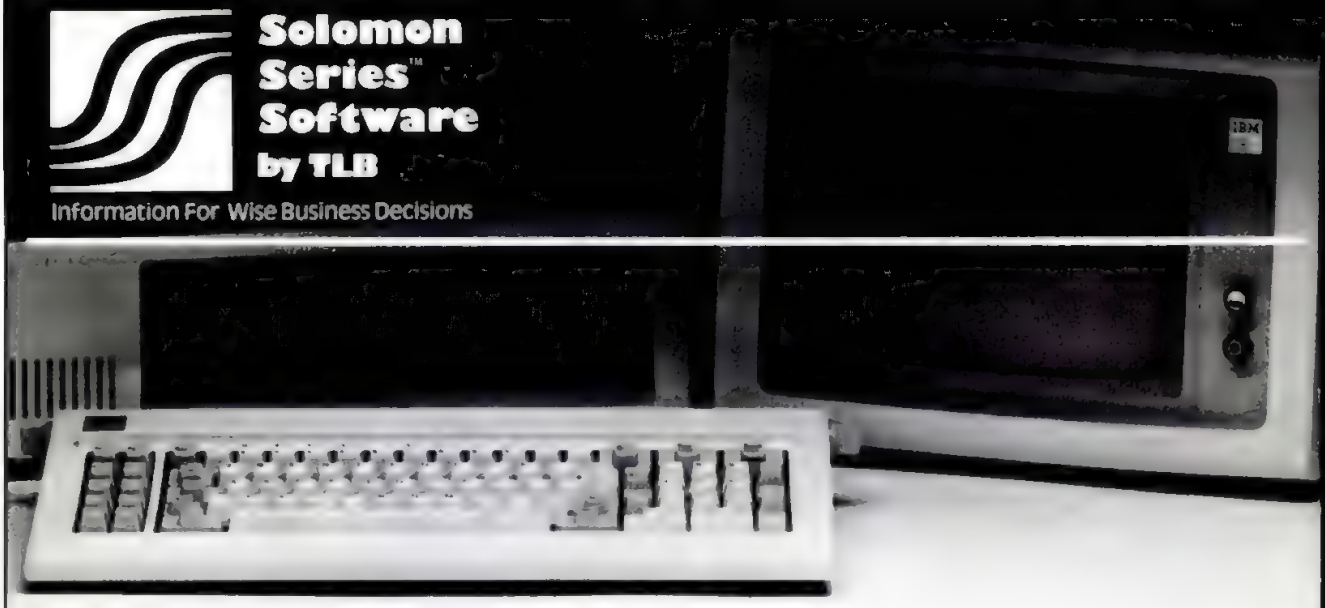
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2119		x	
2210		x	
2220			x
2440		x	
2441	x	x	
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4562		x	x
4625		x	x
4626			x
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4835		x	x
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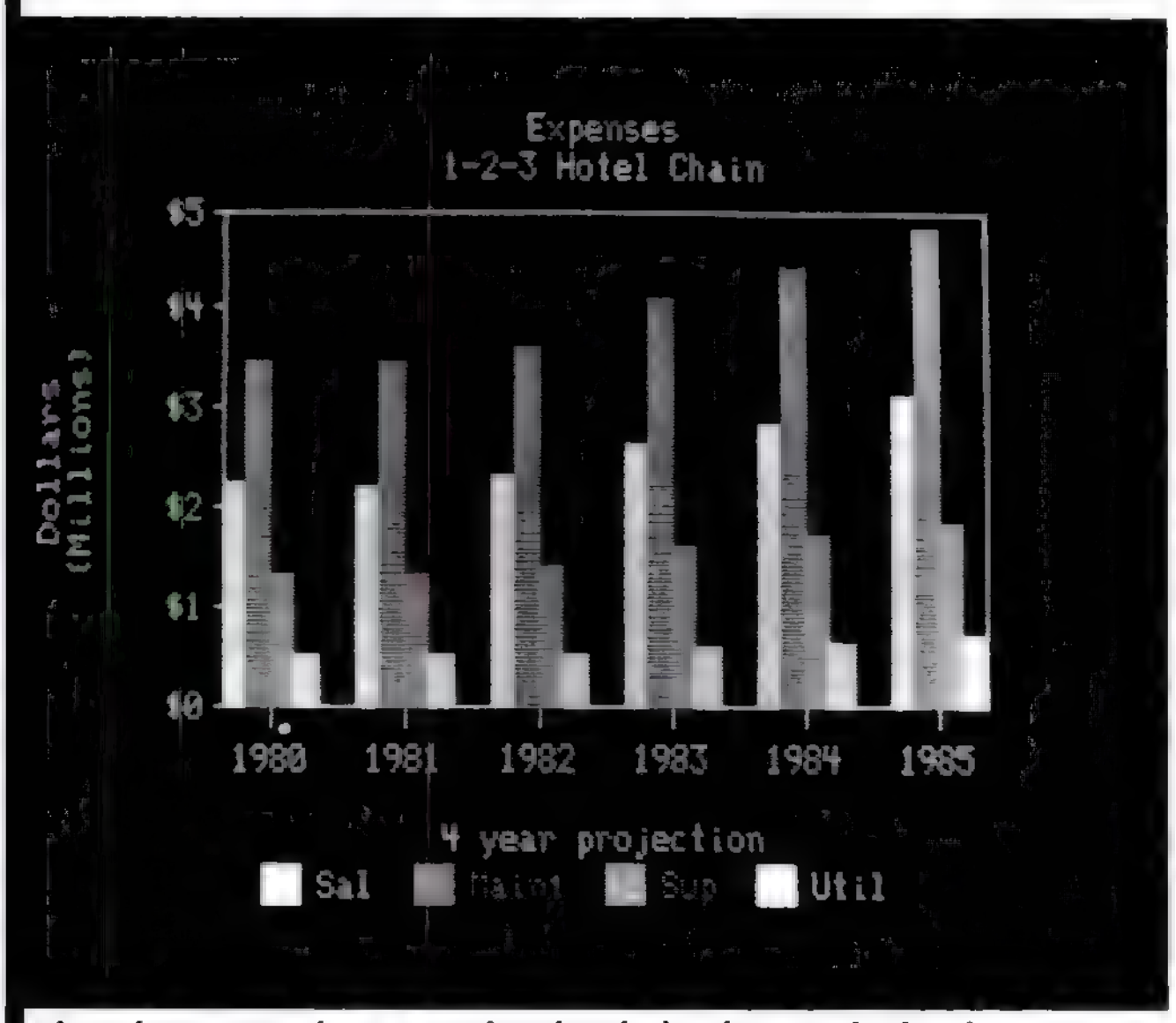
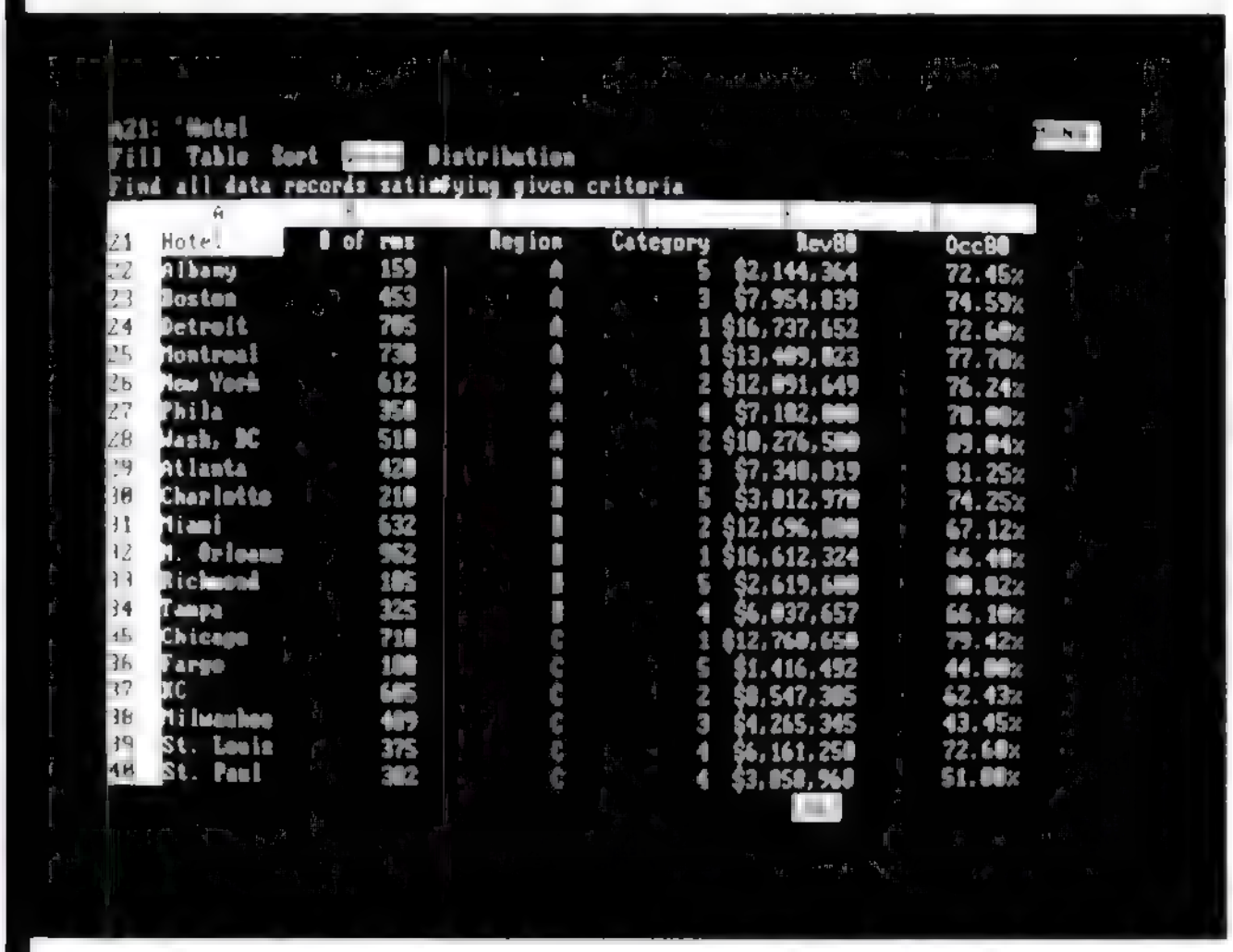


photo demonstrates how a 1-2-3 bar chart looks when it is displayed on a ochrome monitor hooked to the PC's graphics card. If only the graphics card is ent in the system, this chart can alternate with the spreadsheet. If both the IBM ochrome card and the graphics card are in the system, 1-2-3 will automatically e the spreadsheet to the monochrome monitor and send the chart to the graphics itor. A change in the spreadsheet will cause a change in the bar chart within one vo seconds.



the three lines at the top of the 1-2-3 spreadsheet. The first line tells the location e cursor and it displays the contents of the cursor cell. The second line is a menu ction. The reverse video selection cursor can be moved between menu items with rrow keys. Alternatively, the first letter of each selection can be entered as a mand. The third line gives an explanation of the highlighted menu selection. It contain an explanatory sentence or a listing of additional subfunctions.

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tors (A1, B7, and so forth). The second approach involves the use of the cursor again. The cursor can be used as a pointer to show the program which cell or block of cells you are interested in. This ability is particularly useful for designating a block of cells to be replicated or moved. You can run the cursor around the block

ALMOST ALL of 1-2-3's spreadsheet commands are familiar to users of present 'Calc programs.

of cells, "painting" them with reverse video. This makes the task easy and fast for you. Adding a mouse would enhance the operation of the program and would free the keypad to be used exclusively for entering numbers.

Data Base Commands

In the 1-2-3 tutorial, a database is defined as a range of cells that stores information organized into records and fields. The records are the horizontal rows in the spreadsheet and the fields are the vertical columns. The individual records in the 1-2-3 database are not related in any way; they are not "owned" by higher-level categories of records.

The fields can contain a mix of any alphanumeric characters. Sorting and selecting can be performed using any one or two fields at a time. The fields can be compared, added, subtracted, or manipulated in other ways. This arrangement makes it easy to change the data in the database and it is perfectly consistent with the "what if?" applications of spreadsheet operation. It is not the preferred method of organizing fields for fast sorts and retrievals, but because of the program's practical limits on the size of the database and its assembly language programming, the speed of database operations in 1-2-3 is very good.

The two main database actions are Sort and Query. The Sort command can arrange the database in either alphabetic or reverse alphabetic order by using one or two sorting fields. If you plan it p erly, this command can accomplish r than alphabetization. It can group rec according to different categories. By p erly designing the fields to be use keys, you can give the records the eq alent of cross index tabs that can be so swiftly by the program.

As an example, suppose you h database made up of a list of empl names and personnel data. Each r with its data would be a horizontal re in the database. One vertical field in record could contain an M or an S to cate married or single. Another could contain an F or M to indicate The Sort command could work on two fields very quickly to arrange records according to marital status

The Query command can opera two ways. In the simple Find action program will find the record or rec with fields that match the criterion will highlight them with reverse vide more complex Extract action will d cate the matching records into a spec designated output range. This ou range can accept all or just a selected of the original record; the items in the put range do not have to be in the order they were in the original s records. The output range area can be printed or saved in a separate file.

EXPERTS want to move throug the program as quick and smoothly as possible.

capability provides a useful kind of r generator.

Under the Query command, the can be searched in a number of diff ways. It is possible to use powerful ean "And/Or" logic formulas to com fields, and also to choose those fields that are larger than, smaller tha equal to a derived or constant fa Wildcard symbols, the ? used for a s character and the * used for mu



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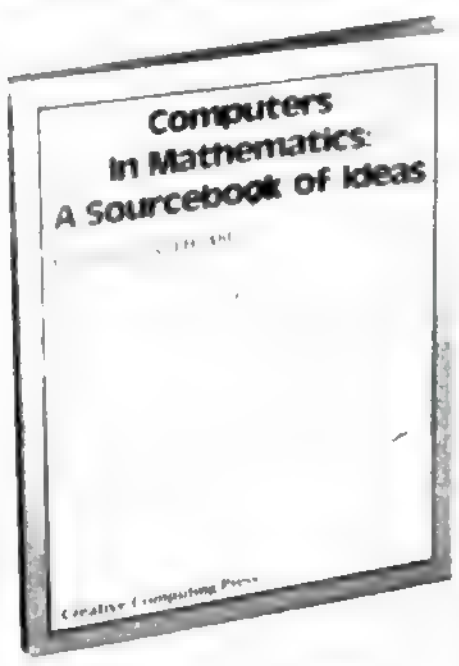
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characters, allow you to with
records that are a close match to you
terion.

The data extraction and report fo
lation actions are probably the most
cult functions to use in 1-2-3. I h
refer to the Help menus and the ma

A USER with some spreadshe experience could beco comfortable with all the power of 1-2-3 i less than 8 hours.

several times before I got everything
Even with this limitation, I think
user with some spreadsheet exper
could become comfortable with 1-2
under 8 hours.

Printing and Graphing

1-2-3 has powerful printing and
ting features. When printing data
in the spreadsheet or database fo
you can select a portion of the origi
be printed simply by running the c
over the desired blocks of data. Th
put of the program's printer routin
be routed directly to the printer o
special file for printing at a later ti

Printing format parameters in
headers and footers, page numberin
page breaks. The program can adj
either single sheet or continuous
paper. 1-2-3 can send its output
IBM PC printer, the Epson MX-8
MX-100 printers, and the IDS Prism
or, 560, and 460 printers.

The graphics module for this pr
comes on a separate disk. It has a ra
features that isn't matched by many
icated graphics software package
commands follow the same format
main program and it can produce
and graphs from data in designate
sections of the spreadsheet.

Bar, stacked bar, pie, line, scatte
X–Y charts can all be produced
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designed to use multiple colors or
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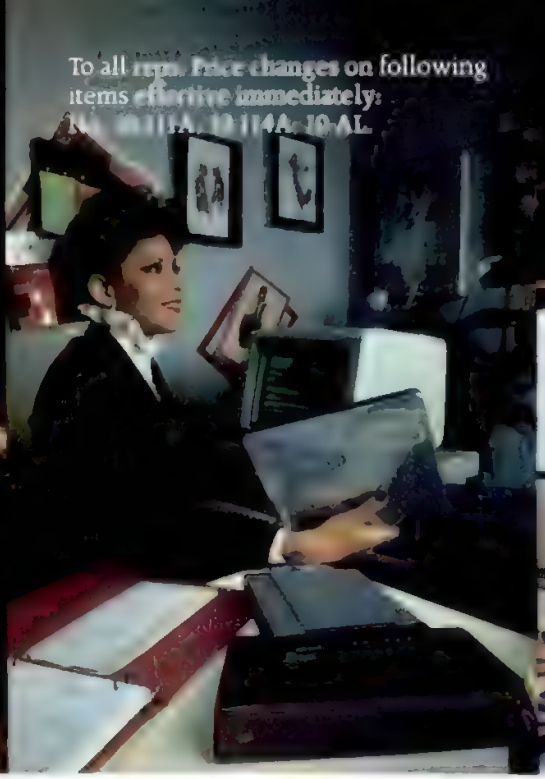
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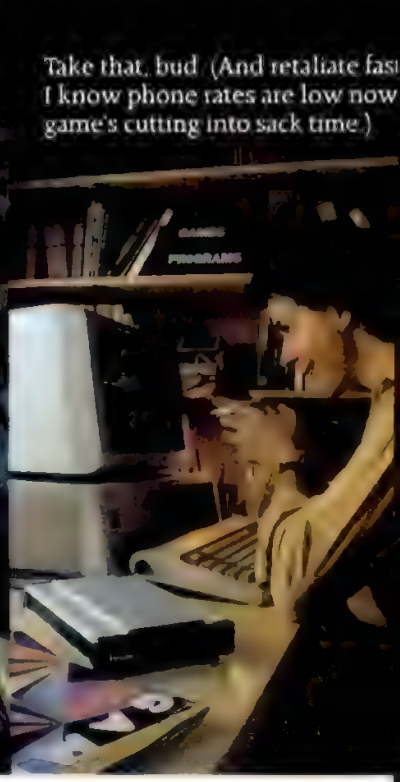
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The Smartmodem 300. Think of it as your PC's telephone. Just plug it into any phone jack, and the Smartmodem 300 sends messages to and from your computer, at 300 bits per second, over ordinary phone lines. Goodbye isolation. Hello world.

More than any other peripheral, a modem vastly extends the usefulness of your IBM. So it's important to get the best modem for your money. (One with a limited 2-year warranty.) The Smartmodem 300 is a wise choice. Far superior to acoustic coupler modems, which connect to the telephone receiver. And it's so easy to use.

It dials, answers and disconnects calls automatically, operating with rotary dials, Touch-Tone* and key-set systems. It works at full or half duplex, which simply means that connecting to a time-sharing system, while a big deal, is no big deal to do.

Indicator lights let you see what your Smartmodem is doing, while an audio speaker lets you hear it. (Is the remote system down, or was the line just busy? This way, you'll know.)

Now all these extras aren't absolutely necessary. We could have gotten by without them. But at Hayes, we're not satisfied with just "getting by." That's why we made the Smartmodem 300 well, smart. You can even program i And we've even provided one for y

Announcing Smartcom II.™ The communications program designed Hayes specifically for the Smartmod If ever there was friendly software, Smartcom II is it!

The first time out, you'll be creati messages, sending them, printing th and storing them to disk. Simultaneo

Likewise, when you're on the rec ing end. Only you really don't need be. With Smartcom II and your Sma modem 300, your computer does it completely unattended! That's espec helpful if you're sending work from home to the office, or vice versa.

But it's just part of the story. For inst before you communicate with anot system, you need to "set up" your computer to match the way the rem system transmits data. With Smartc II, you do this only once, the first ti After that, the information (called p meters) is stored in a directory on th Smartcom II. Calling or answering a tem listed in the directory requires j a few quick keystrokes.

You can store lengthy log-on seque the same way. Press one key, the Smartcom automatically cutes a whole string of numbers to co you to a utility or information servi

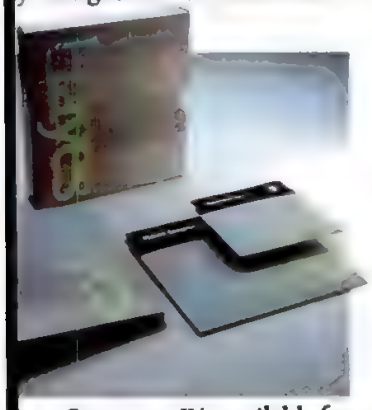
And if you need it, there's alway "help." Even while you're on-line, t screen will display explanations ab

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message or parameter that will
on your way in no time.
tcom II also provides a directory
es stored on your disk. You can
isplay, list, name, re-name or
y file right from the Smartcom II



now Smartcom II is available for
PC.**
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Smartmodem 300 are backed
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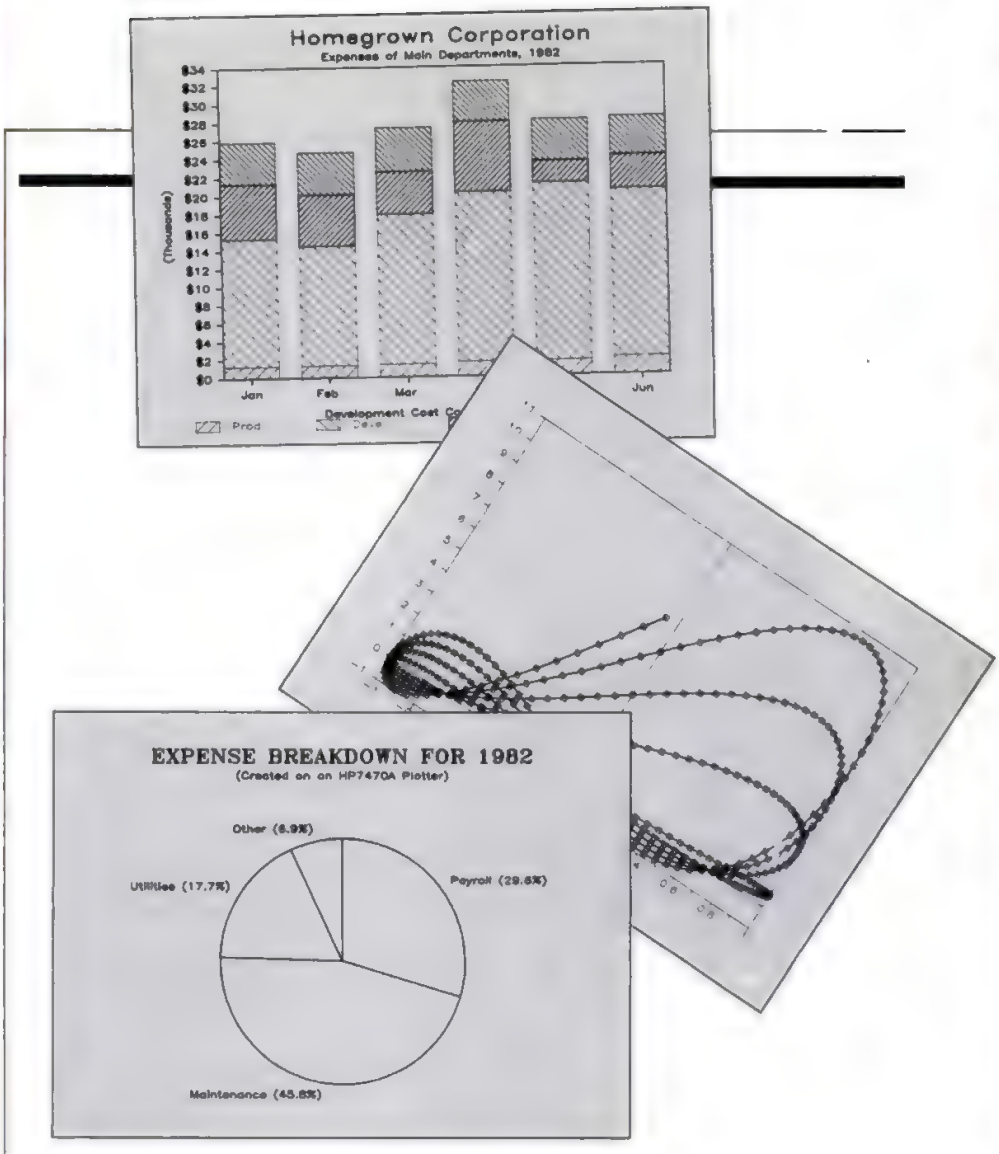


Figure 1: These charts, all produced by a Hewlett-Packard 7470A p otter, illustrate the versatility and graphics capability of the Lotus 1-2-3.

It may sound like a confusion of terms, but you have not seen a PC perform pretty printing until you see a plotter print text under the control of 1-2-3. The program can direct a Hewlett-Packard 7470A plotter to print beautiful characters in roman, block, gothic, and italic print styles. The printing can be vertical or horizontal and be placed to identify each major feature of a chart. The charts and graphs that result from this combination of IBM and HP hardware and Lotus software are good enough to meet the standards of any corporate or government presentation (see Figure 1). The ability to change the data and immediately see the results offers a whole new method of corporate decision making and problem solving.

Challenging the 'Calcs

1-2-3 is a powerful and impressive program. Marketplace rumors say that VisiCorp rushed its introduction of *VisiOn* to meet the challenge of 1-2-3. There are many similarities to be seen between 1-2-3, *VisiOn*, and Apple's Lisa system, but 1-2-3 is available now for the PC at a reasonable price.

The appearance of integrated products like 1-2-3 and *VisiOn* will certainly have an impact on established programs. Indeed, Lotus has made it easy for users of other software to make the transition to 1-2-3 by providing utility programs that can read and use the data in *VisiCalc* and *dBASE II* files. But the challenge of competition can bring surprising efforts from this industry. We should see even more innovative softv.are for the PC in the future. For now, Lotus has set a new level of capability and performance that others will try to reach. */PC*

Conniving on the part of employees helps prod this financial giant to adopt and adapt the PC.

BankAmerica Plugs In To PC Power

One of the nation's leading financial institutions, BankAmerica Corporation, headquartered in San Francisco, had a difficult year in 1981. The firm's balance sheet made for gloomy reading. Earnings fell dramatically from the year before, sinking more than 30 percent below the record $645 million earned in 1980. With interest rates rising like yeast, business was moribund.

In his annual letter to stockholders, president Samuel H. Armacost was candid when he wrote, "We are in a period of transition that involves some painful adjustments for BankAmerica."

COMPUTERS were being bootlegged into the company.

Facing Challenges

One of the challenges facing the giant bank was to take advantage of technological advances promising to offset rising costs through greater productivity. The company could enlarge its convenience, response time, and the caliber of service, but the initial investment for these state-of-the-art systems was steep. BankAmerica was, in the words of one industry analyst, "laying new foundations for the long haul."

The IBM PC was a cornerstone of that new foundation and BankAmerica began ordering the machines by the hundreds. "Our entire executive staff, from Sam Armacost on down, now has IBM PCs," said one BankAmerica insider.

Computers are nothing new at the organization. It's 17-story San Francisco computer center occupies an entire city block and maintains a vast electronic library of financial information on every conceivable aspect of the world economy, including the exchange rate of the Swiss franc to the price of Florida orange futures. The "Main Brain" in San Francisco has 20 counterparts worldwide. These have been spinning their tape reels, and improving the effectiveness of the institution's operations for decades.

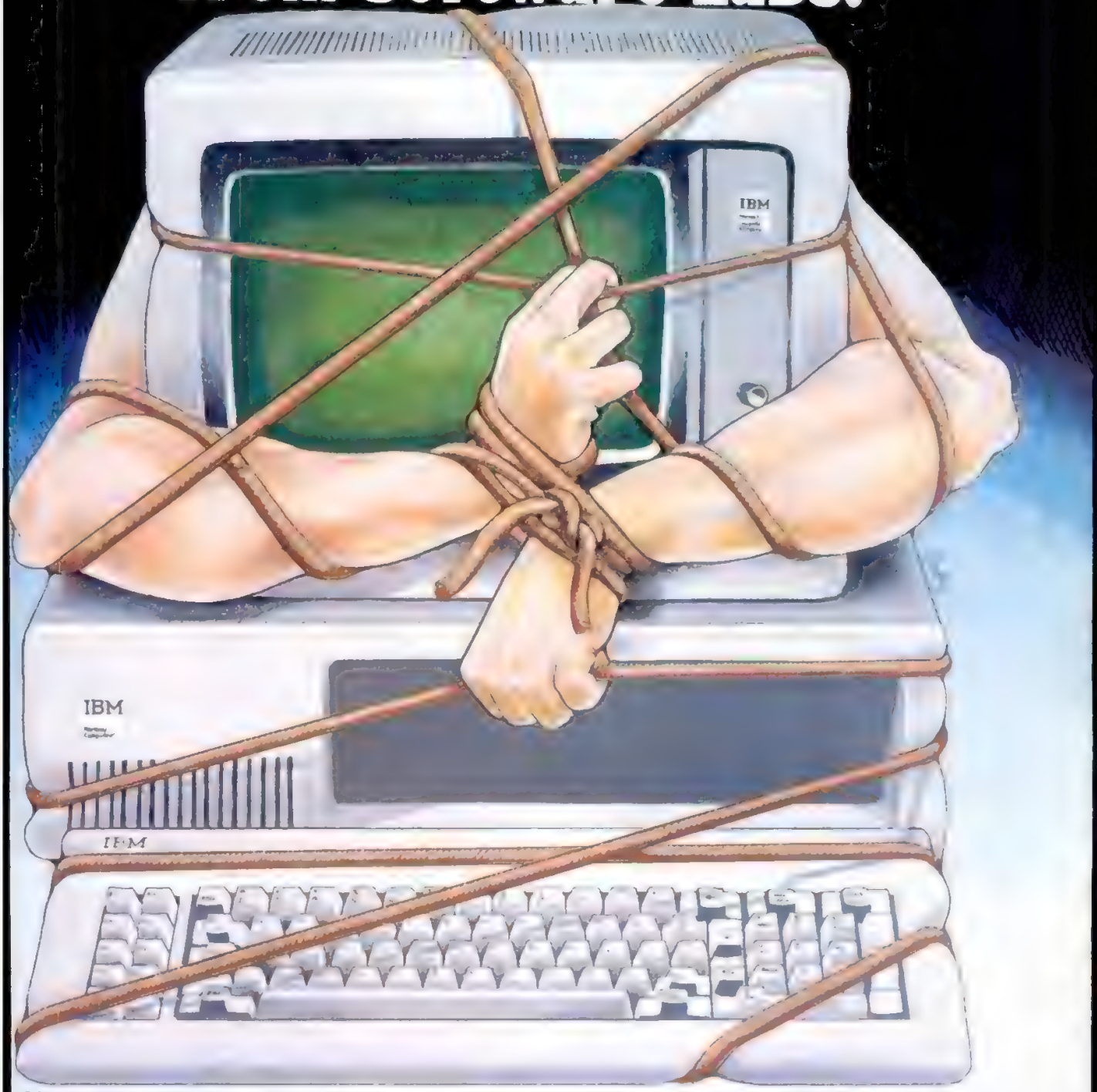
According to Bill Lee, the head of BankAmerica's International Comm cations Office, the computer revol arrived at the bank late in 1981 wh stream of independent-minded em

BANKAMERICA began ordering the machines by the hundreds.

ees began smuggling micro comp into their offices. "People were b them as stationery," Lee recalls. " were ordering them on their own a and putting them on the expenses company as paperweights and office plies. We didn't budget for them last and nobody knew what channels through to buy them. Rather than through our data processing depart each individual office would budget as 'miscellaneous supplies.' "

Lee continues by noting, "The

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chasing department didn't catch on to what was happening until the end of last summer," he explained. Someone noticed a lot of suspiciously expensive paper was being bought from Bay Area ComputerLand stores. After some detective work, the purchasing department discovered that computers were being bootlegged into the company. The discovery prompted a decision to allot a budget for computer acquisition—and in the interest of uniformity throughout the bank's communications system, the IBM PC was selected as the firm's general purpose office computer.

THE ELECTRONIC message operation alone saves the bank several million dollars a year.

Adopting the PC

The bank's decision to adopt the PC as its standard was clinched as much by its performance in competition with other micros as by IBM's reputation. "You have to realize that we have Apples, we have DECs, we have Altos, we have every type of personal computer that exists—and some that don't even exist in the retail marketplace. In an organization this size, you have to buy everything," Lee said, "because you don't know which one is going to be a winner. So when IBM came out with its micro, we got that, too. But now it's clear the IBM PC is becoming the dominant entry in the market."

The first officially purchased IBM micros began to arrive at the bank in the fall of 1981. "We bought some of the first PCs on the market," Lee said proudly. "Now they're exploding like locusts inside the bank, and they're performing every imaginable task. A lot of the machines were originally justified on the cost and productivity savings they would afford through the use of *VisiCalc*."

The machine's chameleon-like versatility soon earned it a niche in virtually every department in the bank. The company uses PCs for new banking services, as well as internally to track stock issues and portfolio management. Bill Lee has one of the units beside his desk. He considers it his touchstone to the bank's vast array of financial information.

First thing every morning, Lee logs into the bank's global data network to get the day's electronic mail from Hong Kong, Singapore, London, or Frankfurt. Bank productivity experts have calculated that the electronic message operation alone saves the bank several million dollars a year. "The improvement in communications coordination it affords is invaluable," says Lee.

Lee is a true believer in the IBM PC. He has three PCs in his home, and uses them to maintain communication with the bank on weekends and evenings, sending work back and forth among offices around the world.

Various Applications

And like thousands of businessmen nationwide, Lee uses the *VisiCalc* electronic spreadsheet almost every day in some manner, and hails it as a godsend. "You can change your assumptions, project the worst case and best case, change the inflation factor and see the result. If market penetration is not as good as we anticipated, or better than we anticipated we can determine the net affect. We can also determine how many more people it takes to make the product or how much more floor space it may take to house the production group. You can put all those variables within one model, change any one of them, and see the net result." Lee often pushes the program beyond its accounting functions to simulate the operations of the bank's worldwide communications network.

In addition to systems modeling, Lee follows another growing executive trend by using the PC to do much of his own word processing. "I have *WordStar* and *Volkswriter* on the unit, in addition to *VisiCalc* and *Supercalc*. So I rough-draft letters or memos and then send them to the secretarial pool. I can bang out a letter faster that way than if I was forced to sit down and write it longhand. Besides, it's hard to read my handwriting. I'm a physicist and an engineer," he said.

Calculations formerly done with the aid of ten-key adding machines or programmable calculators and spreadshe
are now done routinely on the PC. "
now hand financial data on funding p
posals and the like back and forth on di
we print out a copy to go with the prop
als. However, most of that work is n
passed back and forth between dep
ments on *VisiCalc* models," expla
Lee.

Besides streamlining the institutio
internal bookkeeping, analyzing the p
formance of investments, and speed
recordkeeping activities, BankAmeric
using micros to improve customer
vices. Lee states that one innova
application could turn the home of ev
computer owner into a branch bank.

"You can run a lot of banking servi
in the home; in fact, we're doing that n
It's in a pilot stage with employees
rently, but we're going to go public wit
soon. Every service performed by a
matic tellers—except get cash—can
done at home on your personal compu
You can pay your bills with it, tran
money between accounts, determine y
savings and checking balances. In
future, we'll significantly cut the cos
transactions by reducing the amoun
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depositors, too. "Customers with
tween $50,000 and $500,000 net a
require a lot of services like estate p
ning and special business transacti
They want a lot of personal services
quick access to a lot of information,"
noted. When such a customer come
for a financial consultation, the ba
can sit that person down by the desk
run through the figures on the scr
"Using the PC, we're able to give the
tomer a better understanding of w
taking place in the market. This little

ssit there and actually show you "s going on in the marketplace. To h it is to understand"

rrill Lynch

Wearing one of his other hats, Lee s as a consultant to Merrill Lynch, lh is in the midst of an ambitious outerization program. Merrill Lynch illish on the IBM microcomputer use its information-managing potenmay make it the most important nce in stock-trading technology the ticker tape. "The company is ling some 10,000 PCs in brokerage s across the country," Lee reported. ants one on every broker's desk." microcomputers at their disposal, rs can handle scores of custom- accounting projects and work out idual trading strategies.

e savings in time and improvement vice provided by individual microuters should enable brokers to make commissions. A broker with a computer can easily run off 500 letters to his or her best clients and make them all look as if they were individually typed. "It gives you a greater reward for your time," Lee says. It should be noted that a delay of 5 or 10 minutes can make a great deal of difference to a stockbroker.

USING THE PC, we're able to give the customer a better understanding of what's taking place in the market.

Lee discounts the importance of intuition and inside gossip to a broker's success. "Intuition is only a function of information," he declared. "The faster, cleaner and more detailed your information, the better your intuition to make a decision. The computer enables you to see things you couldn't see before." Gossip and reading between the lines in the *Wall Street Journal* are important, too, Lee grants, "but when you want the information before you to do a financial technical analysis of a situation, then you need a tool that does that analysis at the push of a button." Because the buying and selling of stocks involves the transfer of millions of items of information—market quotes, status reports on trades, news items, and fluctuating economic indicators—brokers with computers at their disposal should have a distinct advantage over their less well-equipped colleagues.

Nevertheless, by taking the lead position in installing micros, "Merrill Lynch is doing something gutsy," Lee says with admiration. "The company decided to make its move in technology when the market was down and activity was low so it could put new, innovative processes in place to handle the crunches that most inevitably come in the future. */PC*

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st select "Add a name record" from the menu and fill in the nks which appear on your monitor. Even if you type with one ger the new name record will be added in just a few seconds. UNMAIL I" even includes duplicate name detection.

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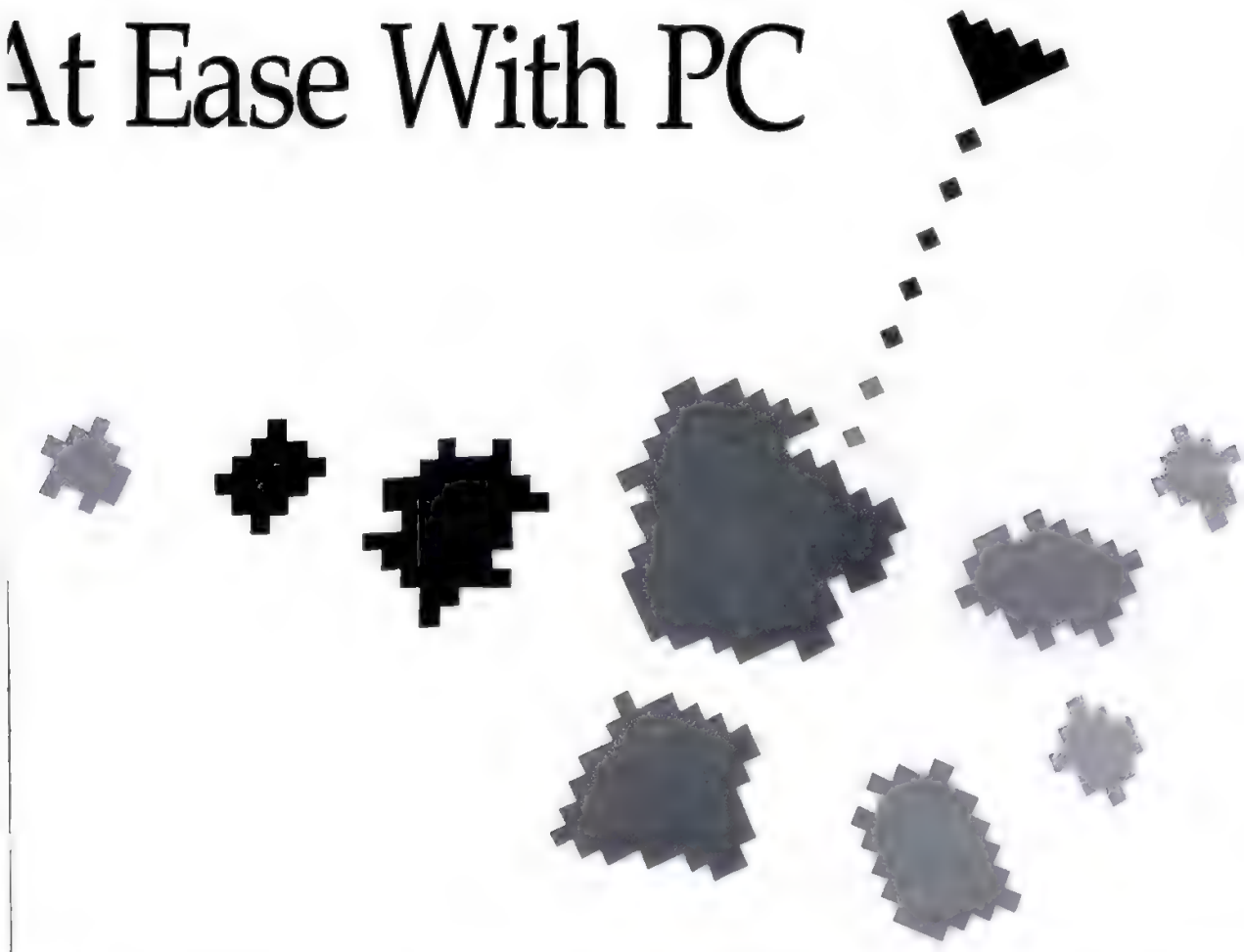
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CIRCLE 294 ON READER SERVICE CARD

peek into the PC Arcade this month confirms that me designers are wells of inspiration but a little ieven in the execution of their ideas.

At Ease With PC



PLE PANIC
derbund Software Inc.
3 Fourth St.
Rafael, CA 94901
) 456-6424
uires: 64K, Color/graphics adapter, r or monochrome display.
Price: $29.95

LE 694 ON READER SERVICE CARD

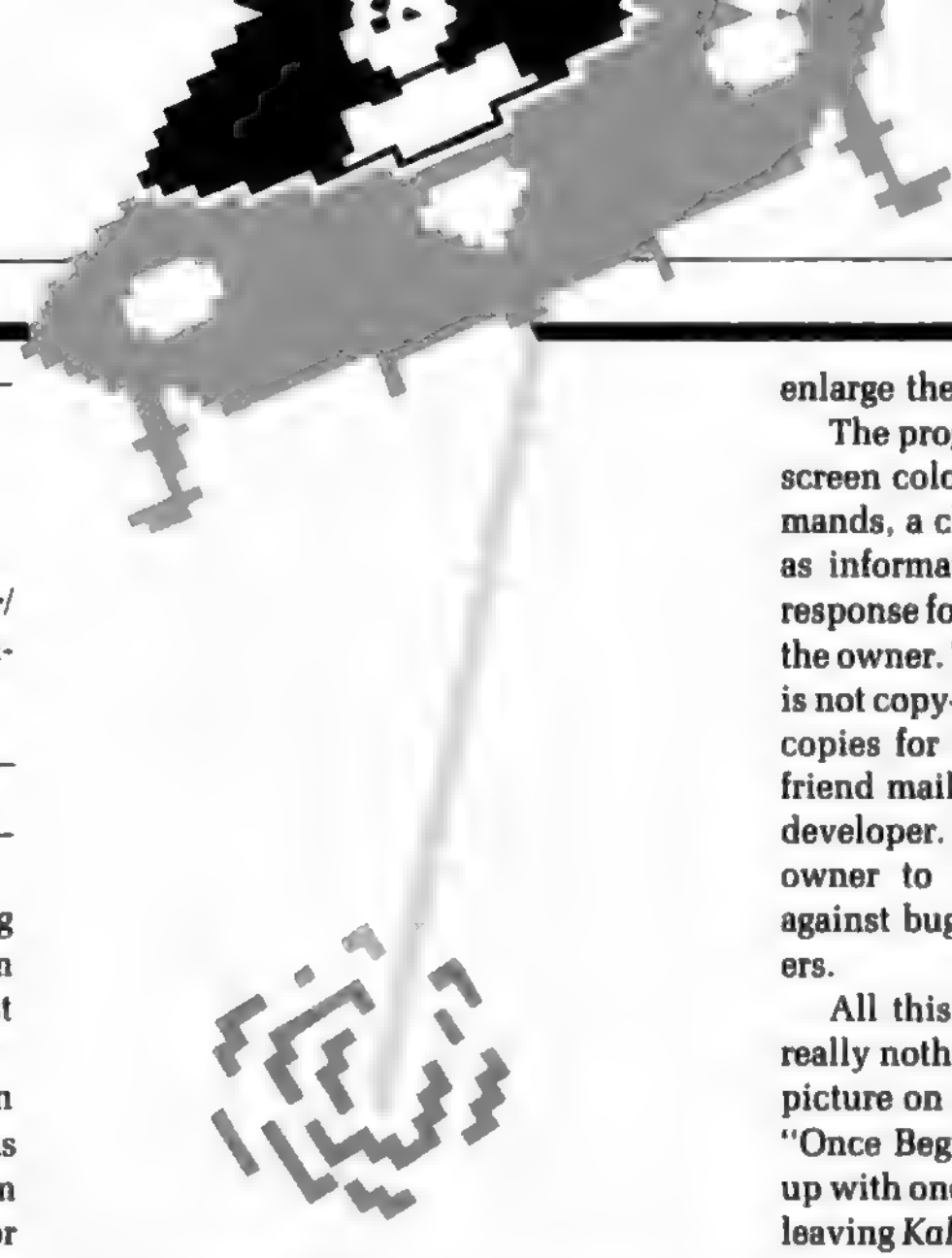
and describe this game without ding silly: You are being chased ugh a multi-level mansion by little es with feet. You can dig holes in the floor to trap them or climb ladders scape them, but sooner or later, it es down to you or the apple.

es, *Apple Panic* is a pretty dumb . It's also fun to play and pretty to watch. The game is not new; Broderbund Software has managed to squeeze extra life out of this product by converting it from its very popular Apple II origins to run on the PC.

Apple Panic is a welcome change from the endless stream of shoot-em-ups in space, but it still has an edge of violence. Relentless attackers they may be, but those little apples are cute fellows replete with legs and probably mommies and daddies. And your goal is to pound them senseless with a little hammer once they get caught in the hole you've dug for them.

Pounding an apple through the bricks scores 100 points per level. If the unlucky fruit falls two floors, you get two points. If you reach one of the upper levels, you earn the right to cream a Green Butterfly and earn 200 points per floor. And finally, there is the Mask of Death, worth 300 points per drop.

Apple Panic requires the color/graphics board, but would be readily playable on a monochrome screen. It was tested on an RGB color monitor, and the animation and colors are very impressive. Response to commands is quick, despite the fact that something is always moving in one direction or another on the screen. You move the player by striking an A for up and a Z for down, a left apostrophe for left and a right apostrophe for right. The space bar controls the hammer. There is no command to suspend the game in mid-play and no record on the disk of high scores.



KALEIDA
Once Begun Computations
Searsport, ME 04974
(207) 338-1082
Requires: 64K RAM, PC-DOS, Color/Graphics board, color monitor or television.
List Price: $12

CIRCLE 696 ON READER SERVICE CARD

Have your fingers recovered their spring after typing in the *Kaleidoscope* program listing that appear in *PC Magazine* last issue?

Honestly, there was no secret plan involved, but just as that edition was going to press, a commercial program called *Kaleida* came in the mail for review. No squinting to read a program listing, no hours of typing, no deciphering of BASIC error codes. This one should work when you take it out of the box, and it is very reasonably priced.

Kaleida actually offers even more than the moving picture that we published last month. It allows you to select one of ten pallettes and one of three different central star patterns in one of four colors. You can vary the speed of the developing kaleidoscope, freeze the action, and shrink or enlarge the image.

The program includes a nifty set o screen color charts of the keyboard mands, a check of display colors as as information on warranty, and a response form which can be printed o the owner. The license for *Kaleida* (w is not copy-protected) allows you to copies for a friend, asking only tha friend mail in a $4 registration fee t developer. The fee entitles the secon owner to the same lifetime guara against bugs offered to original purc ers.

All this said, the *Kaleida* progra really nothing more than a pretty m picture on your screen. But the peop "Once Begun Computations" have up with one extra little dividend to ju leaving *Kaleida* on your screen all da hitting the . key, the screen displays a ning clock, taking its information the DOS sign-on time. So, this pro lets you turn your PC into a pretty, ing wall clock. What will they thi next?

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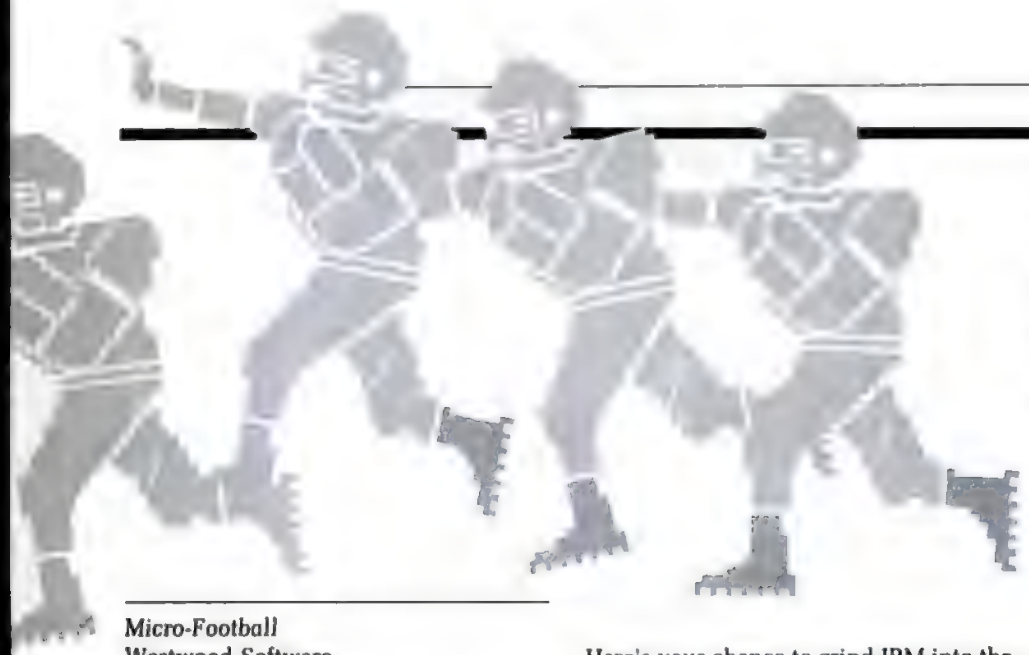
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Micro-Football
Westwood Software
1670 N.W. Emperor Dr.
Corvallis, Oregon 97330
(503) 745-5500
List Price: $29.95
Requirements: 64K RAM, PC-DOS, Color/Graphics adapter, color or monochrome monitor.

CIRCLE 695 ON READER SERVICE CARD

Here's your chance to grind IBM into the mud, sport fans.

Micro-Football hands you the reins of a professional football team, pitted against "IBM" on a 6-inch green, blue, or black playing field. You are offered eight different types of running plays: dive, off-tackle, scissors, trap, sweep, option, reverse, or draw. There are six variations of the passing play: sideline, look-in, roll-out, screen, fly, and post. And finally can call for a field goal, a punt or a sr quick kick on offense.

When it comes your turn to play "FENSE" the alignments are: the 4-3 set-up, the 5-2 "nickel," a short-ya line and a "prevent" defense.

The choices may be adequate to for a bit of thought from time to tim

THE PROGRAM seems much more oriented to random chance than to defens or offensive strateg

the fact is that the algorithm of th gram seems much more oriented t dom chance than to defensive or sive strategy.

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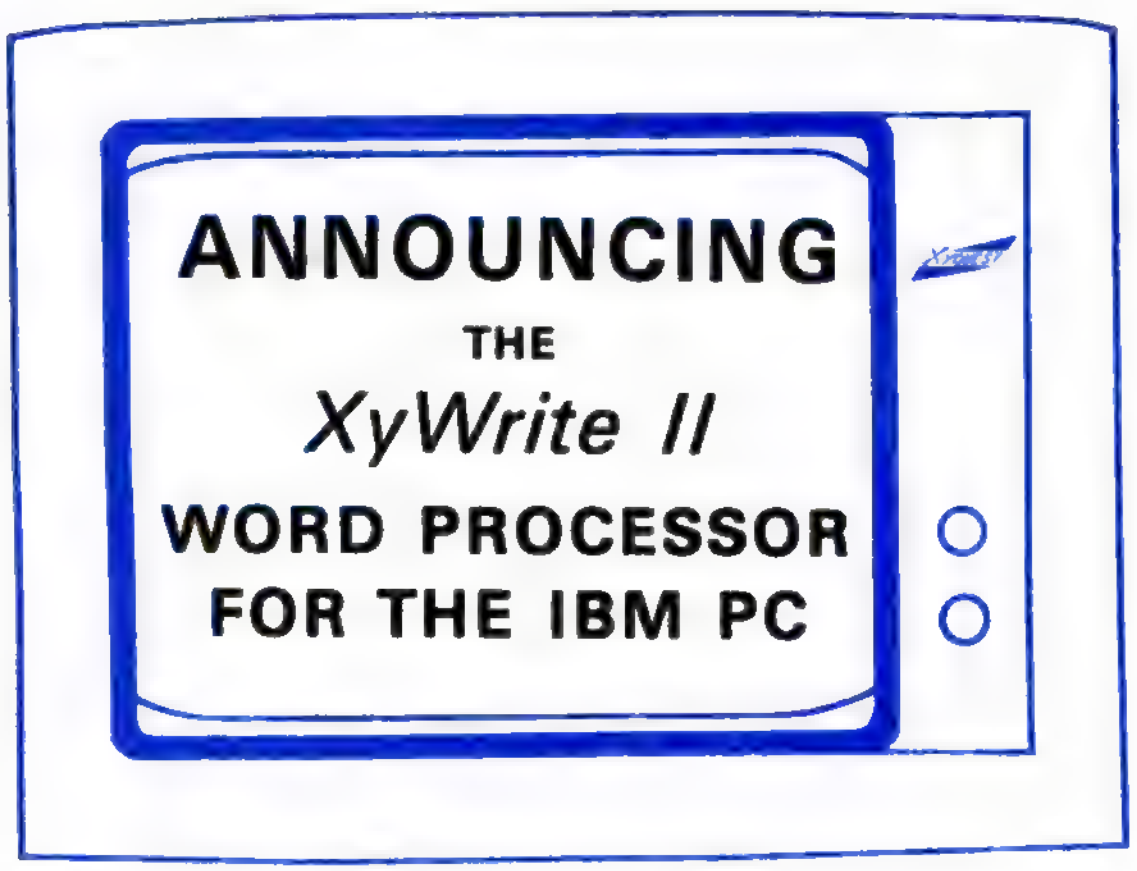
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CIRCLE 127 ON READER SERVICE CARD

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CIRCLE 501 ON READER SERVICE CARD

The onscreen display, too, is rather disappointing. You are presented with a line drawing of a football field as it might be seen from the Goodyear blimp, with the field goal posts angled outward. You are a little O, and the ball, when it moves, is a moving solid line. There is no depiction of players on the screen, and the ball moves as a single solid line up and down the length of the field, never varying from the center hash mark even if you've cleverly called for a sideline pass or a sweeping run. The sound effects are almost sharp enough to cause a wire-haired terrier some pain, but there was no attempt to put in a hint of crowd noise—a relatively simple bit of white noise would have done that trick.

Figure 1: Example of halftime statistical summary from Micro-Football.

HALFTIME

STATISTICS	PC DISK DRIVERS	IBM
POINTS	14	Ø
FIRST DOWNS	5	2
RUSHES-#/YDS	9- 62	1Ø- 24
PASSING YDS	9Ø	11
RETURN YDS	38	41
PASSES-CP/AT/INT	5- 6- 1	2- 4- Ø
PUNTS-#/AVG YD	Ø- Ø	2- 42
FUMBLES-#/LOST	1- Ø	1- 1
PENALTIES-#/YDS	1- 5	1- 15
NO. OF PLAYS	16	16

One nice feature of the game is a halftime and final statistical summary (see Figure 1).

IBM went into even more of a defensive posture in the second half, holding the PC Disk Drivers to about 20 yards and no points. The final score, though, was a triumph for the independents, a 14-7 PC win.

With the exception of the statistics, though, what Westwood Software has done is essentially transfer the back-and-forth, unspectacular action and beeps and boops of a handheld electronic football game to the powerful microcomputer. We deserve a bit more, considering the price of a ticket on the IBM PC 50-yard line.

The Chrome Ranger
Omniware
8972 East Hampden Ave., Box 32
Denver, CO 80231
List price: $29.95
Requires: 64K RAM, PC-DOS, monochrome display and card or color/graphics card and monitor or television. Game adapter and joysticks are optional.

CIRCLE 697 ON READER SERVICE CARD

You could call this one "*Pac-Man* Punches In."

The Chrome Ranger is a quite competent evocation of the successful arcade game, with a very important addi
You can play it on a standard plain-v
la office-configured IBM PC. Yes, w
the boss is out of sight, you can play
Chrome Ranger on a PC with 64K of R
a monochrome monitor and the cu
keys. The sound can be turned off,
From the other side of the desk you
look as if you were hard at work punc
in a very long and repetitive set of r
bers on the keyboard's number pad.

The program also supports a full c
display driven by the color/grap

THE SOUND effects are almost sha enough to cause a wi haired terrier some pain.

board. A joystick can be used with e
the color or monochrome version if
computer includes a game adapter b
as well.

If there is anyone out there who
not know the all-too-familiar *Pac-*
(and clones) scenario, it is this: The
tral figure is an electronic homunc
whose sole purpose in life is to eat
eaten. He (or she, in the arcade "Ms.

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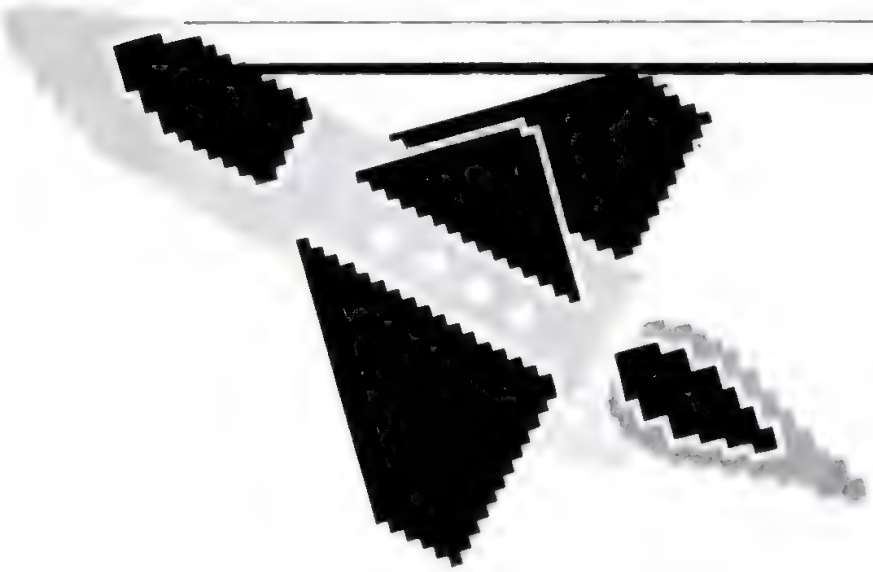
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CIRCLE 293 ON READER SERVICE CARD



the technical specifications of the n
chrome display card, the reaction
ranger to joystick or keyboard comm

THE CENTRAL figure is an electron homunculus whose s purpose in life is to e or be eaten.

Man" version) chases around a maze gobbling up dots of one sort or another, pursued all the time by voracious enemies. In each of the corners of the maze are "energy dots" or "magic pills" or somesuch special potion. If the hero eats the dot, all of a sudden he is endowed with a brief burst of bravado, and can turn around and devour the nearest attacker.

THE PROGRAM IS self-calibrating for joysticks.

And, so *The Chrome Ranger:* On the color monitor, the game is attractively drawn, with a white muncher and multicolored pursuers. The ranger himself emits a cute chomping sound as he gallivants around the maze. The on-screen maze is relatively full, and the more advanced mazes include dead ends, which make for some mad in-and-out dashes.

But it is really the monochrome screen version that is the star of this product. The maze and players are drawn with ASCII characters with great care. And because of

is noticeably quicker than with the
graphics card version. The only draw
would seem to be that there is no w
tell whether the ranger is invulne
On the color screen, all of the chaser
their hue for a few seconds.

If both display cards are mount
the PC, the program asks you to selec
or or monochrome. Other choices in
three levels of difficulty, choice o
stick or keyboard control (the arrow
or the A-Z and J-K letters for up or
and left or right), and the toggle on
for sound. The sound, by the way, i
sufficient to add some interest and n
raucous as to interfere. The progra
self-calibrating for joysticks.

All in all, *The Chrome Ranger* is a
thy game to be played while waitin
Tonto.

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e night clerk's digital watch wed 2:35 a.m. when the desk phone interrupted his entory updates at the IBM PC. vas a double ring. An outside . Williams sensed trouble as ounched line 3.

"Worldwide Widgets, lliams here."

"Walla Walla Widget Works," he the reply. "One of our gets went."

"What type?"

"Wingtip."

Williams winced. World- le hadn't made a wingtip get since way back when.

"We wouldn't have a wingtip get at Worldwide, Sir. They're olete."

"If we don't get one by dnesday," the voice wailed, 're wiped out."

There was one chance. The 1 Database Management tem. If he could track down last time a Washington dealer ordered a wingtip widget...

Williams was no program- , but that didn't matter. ning to the computer, he put question to RL-1 in simple lish:

```
elect DEALER, QUANTITY, DATE
om INVOICES
here PART EQ "WINGTIP WIDGET"
nd STATE EQ "WASHINGTON"
```

Within seconds, Williams his answer. A dozen wingtips nt to Wally's Widgets 6 years . But would Wally have any ?

Yes! Waking Wally was well rth it. The last wingtip widget in Wally's warehouse was on its way to Walla Walla.

Who? What? Where? When? Why? RL-1 knows.

Give your micro the power of RL-1, and you'll be able to handle data like a master detective. Without mastering BASIC or COBOL or FORTRAN or any other mysterious language.

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Case in point: standard programming packages. Like accounting, for instance, or inventory control. Most are fine for what they're programmed to do. Beyond that, even the simplest questions can leave them without a clue. Whether it's searching through invoices for missing widgets. Or looking for customers with too much debt. Or finding the address of your aunt in Vermont. Conventional programs just aren't smart enough.

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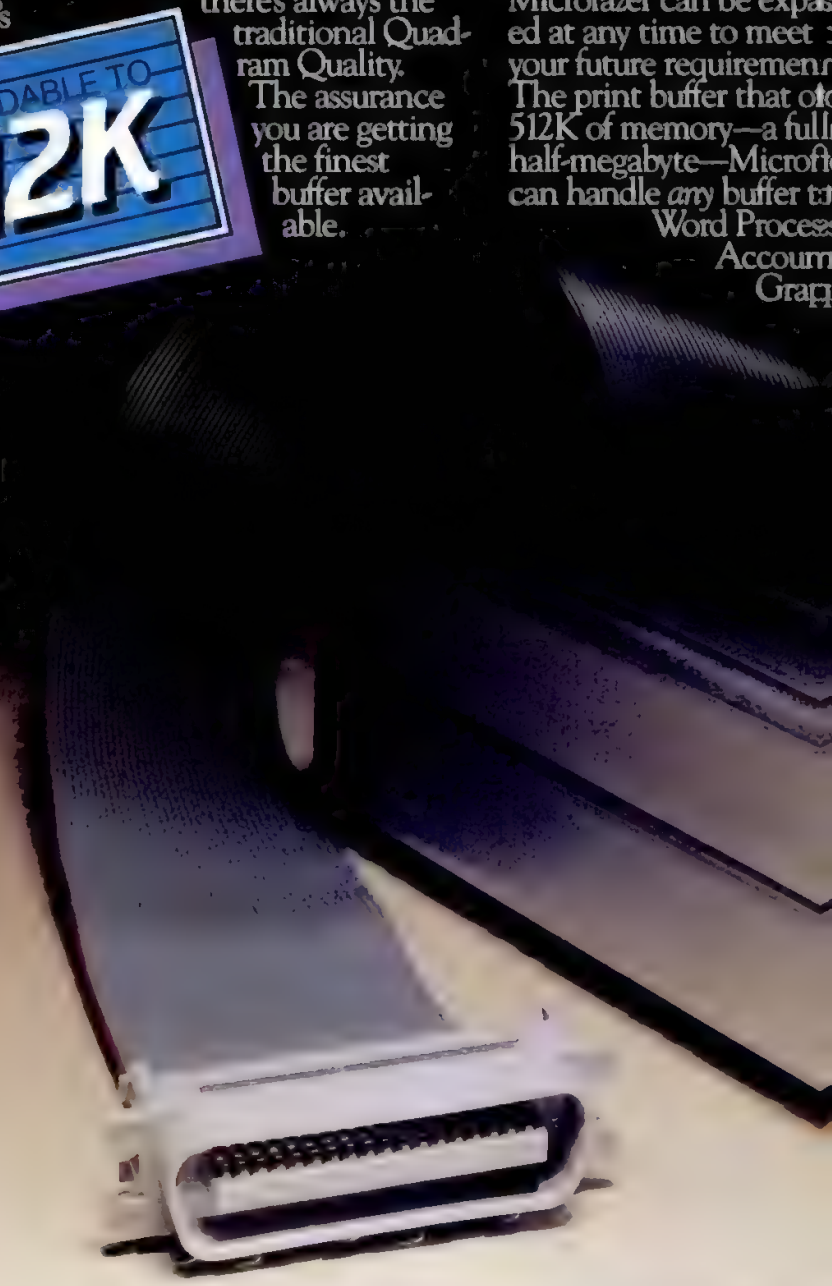
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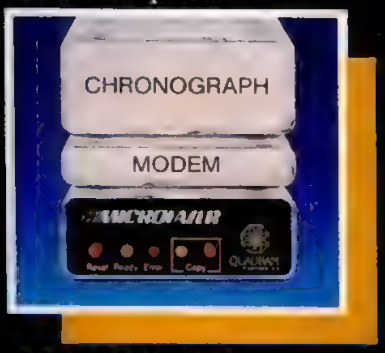
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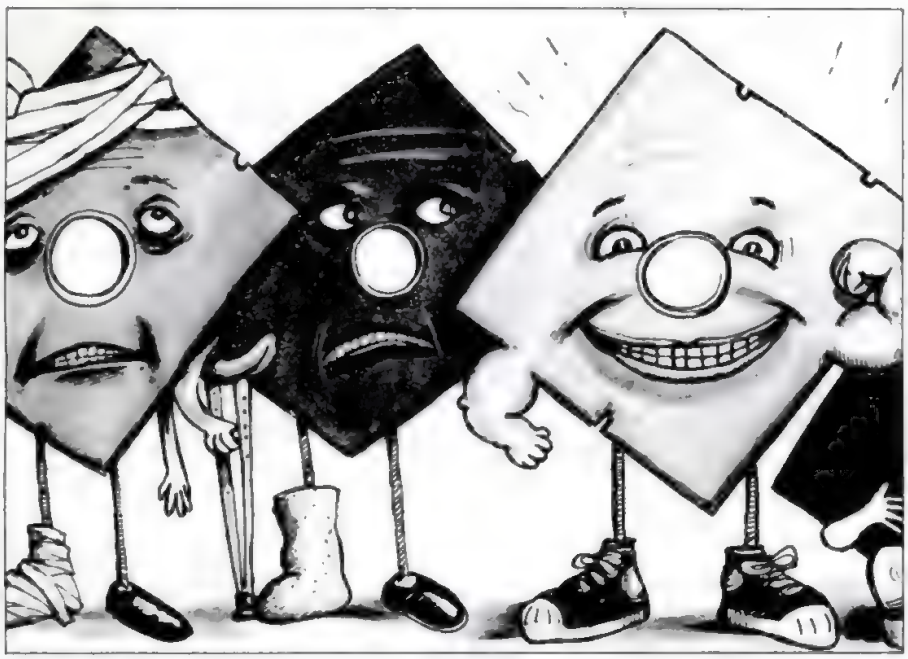
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Select is a full-featured word processor/spelling checker/mail merge program aimed squarely at the business and professional market. According to Craig Rudinger, Vice President of Marketing for Select Information Systems (SIS), the firm is "virtually 100 percent committed to the business environment, ranging from the individual who has been trained to operate a dedicated machine and is now converting to a microcomputer, to lawyers, writers, and other professionals.

"That's the environment we really relate to. Although we feel everyone can benefit from *Select*, the product is not aimed at the casual user who wants to send an occasional letter to Aunt Millie." SIS counts among its customers Ford Motor Company, Citibank, Hughes Aircraft, and other major firms.

By and large, the *Select* program and documentation confirm Rudinger's observations. There is often a trade-off between the power and features any program offers and the ease with which you can master and begin using it. *Select* strikes a good balance. A thoughtful design, a sound fundamental approach, and an onscreen instruction module called Teach make the program's basic features exceptionally easy to master.

The Teach module and program documentation are considerably less suc ful, however, in showing you how t the program's more complex fea And, while you can begin creating printing text in under two hours, th reason to doubt that you'll be ab "teach yourself word processing minutes or less" as the firm's promot literature claims. *Select* also has a ber of limitations that may or may n important, depending upon your sp needs.

Nevertheless, when you conside market the product is designed to se secretaries with no previous exposu computers, word processor oper and busy professionals with neithe time nor the desire to master a con program, regardless of its power—S appears to be right on target.

A Departure from WordStar

One of the most important thin understand about *Select* is how the gram's overall approach differs fr product like *WordStar*. In *WordSta* example, once you have begun to wo a document, you are always in might be called the "text creation" m Whenever you want to set margins, a the text, set a block marker, or do virt anything else, you must leave this by striking the Control key, plus a let go to one of several onscreen menus. menus are displayed only when the est "help" setting is used.) Next, you enter your other commands or spec tions. The program takes care of bus and then drops you back into text cre mode.

Select approaches word processi a different way. With *Select*, yo always in "select" mode. If you wa

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ate text, you move the cursor to your get point, hit the I key for "insert," and e text. When you are finished, you ss the Escape key to leave "insert" and urn to "select." From there you can pose the F key for "format," the P key to "pointers" (block markers), the S key "spell," and so forth.

This overall approach is important for least two reasons. First, it saves keyokes. In *WordStar*, you must strike the ntrol key and the appropriate letter key get to a particular menu, then strike other key to make a selection from that nu, and finally type in your specifications for that selection. With *Select*, you a single letter and respond to the ulting prompt by typing in your specs. r example, to tell your PC to find a parular word in your *Select* text, you hit L key for "locate," respond to the mpt by typing the target word, and hit Enter key. The cursor immediately es to the word and the system drops u back into "select" mode.

Second, these simple letter commands inherently easier to remember than n-mnemonic combinations like "control key-menu letter-menu selection." Of urse, much depends on what you come accustomed to. Some people are solute whizzes at *WordStar* and uldn't dream of using anything else. d in truth, *WordStar* is the more powful program. But because of its basic proach and simple letter commands, lect is much easier to master.

WHEN YOU onsider the market the product is designed to erve, Select appears to be right on target.

sing Select

There is no substitute for a hands-on, t-it-through-its-paces demonstration of word processing program, particularly you're a writer or professional who has use it every day.

There's more than a little truth to the quently published stories of some author's attachment to the Royal, Olivetti, or Underwood typewriter he or she has spent so much time communing with in the past. The typewriter, however primitive, becomes a trusted, sentimental friend. Word processing programs are no different.

Figure 1: Select command line menu

```
>SELECT: Insert Erase Printer Goto Locate Replace Display Quit
Next
Document: (drive:filename)    Char: 1  Line: 1  Page: 1

-------L ------------------------------------ R--------
```

If you're thinking of purchasing the program for an office, the same general rule applies: If at all possible, let the people who are actually going to use it try it out before you make your decision.

In the past, SIS has offered demo disks for use on Apple, Altos, and other computers for about $10. Select recommends that IBM PC end users who want to view a demo should first contact their local dealer, or get in touch with Select directly if their dealers cannot provide one.

Creating and Formatting

After booting the program, your first step is to open a file for the document you want to create. You hit the C key and respond to the prompt, "CREATE: Enter document name, then <RET>." Hit the Return key, and you'll get a "blank page" (See Figure 1).

Pressing the N key for "Next" yields the menu choices: "Spell, Format, Background, Append, View, Xchng, Tab, Key, Help, Next." Hitting the N key again causes the third and final menu line to appear: "Move, Copy, Zap, Output, Write, Justify, Next."

These are the main Select tools. Generally, pressing any letter will cause some type of prompt to appear at the top of the screen. One major exception is the F key for "Format." Pressing this letter causes an entire screen to appear. The screen contains some 14 different formats.

You can use this screen to change margins (left, right, top, and bottom), paper length, and other settings by striking a single key. Significantly, this approach allows you to set all your format specifications at the same time, without entering a separate command to produce a prompt for each one.

When everything is as you want it, you press the Escape key to return to the text. And there you will find any non-default format specifications noted to the far left of the text. A left margin setting of 15, for example, appears as \L15<.

Format settings may also be typed directly into the text using the same "reverse slant-letter-number" format. This can be useful for changing margins within the text as you are creating it.

REGARDLESS of how they are entered, the format settings become a part of the document.

Unlike *WordStar* and many dedicated word processors, *Select* allows double and triple spacing. However, it displays only single spacing on the screen. The program also features text adjustment, which automatically accommodates insertions and deletions.

Regardless of how they are entered, the format settings become a part of the document. You may also enter headers, footers, automatic pagination, and nonprinting comment lines. Pages are numbered consecutively, starting at whatever number you specify.

Text Manipulation

When you are in "Select" mode, directional arrow keys on the PC numeric keypad move the cursor anywhere on the page. You can move one space or one line at a time, or type in a number and hit the desired arrow to move that number of spaces or lines.

One particularly useful feature is the period key. When in "Select" mode, hitting the period immediately sends the cursor to the next period on the page.

To leap long pages at a single bound, you hit the G key for "go to," and respond to the prompt for "Top," "Bottom," or "Page" (number) of the document.

Figure 2: The Teach menu.

```
                    THE TEACH MENU
-------------------------------------------------
DIRECTIONS: 1. Read the menu choices listed below.
            2. Type number of section you want, then press
               RETURN.
             - To leave TEACH press RETURN.
-------------------------------------------------
Your entry: * * (To start at the beginning, type 1).


 1. How TEACH WORKS                15. How to FORMAT
 2. How to MOVE THE CURSOR         16. How to DISPLAY
 3. How to CREATE a document       17. How to VIEW
 4. How to READ THE COMMAND LINE   18. How to set POINTERS
 5. How to BEGIN A NEW DOCUMENT    19. How to MOVE
 6. How to EDIT a document         20. How to COPY
 7. How to INSERT                  21. How to ZAP
 8. How to ERASE                   22. How to OUTPUT
 9. How to XCHNG                   23. How to WRITE
10. How to LOCATE                  24. How to JUSTIFY
11. How to REPLACE                 25. How to use KEY
12. How to GOTO                    26. How to get HELP
13. How to APPEND                  27. How to QUIT
14. How to set TABs
```

You can manipulate text in thr major ways. First, you can set a pointer the beginning and end of a block of text moving the cursor to those points, pre ing the P key, and entering the numb you wish to use. Once a block has be marked, you can "Move" or "Copy" it another location on the page, "Zap" (d lete) it, "Output" (print) it, or "Write" to a new file on disk.

You can also bring files in from yo disk and append them to the text you currently creating, and request an inst directory of your disk(s) to locate the c rect name of the file you're looking fo

The directory includes a line telli you how much space is left on the disk you're not sure what's in the file, you c "View" its contents before inserting it

Finally, you can load files into any all of the ten function keys (F1-F10). Th is useful for quickly inserting frequen used phrases, boilerplate paragraphs, a the like.

Actually, the number of programm ble keys is almost unlimited. If ten ke aren't enough, you can use the numb keys at the top of the keyboard to des nate key files from 11 on. You can ge listing of key file names and view the co tents of any of them at any time using t

Type T for Teach

There's no other word for it. The *Teach* feature included as part of the *Select* Word Processing System package is simply super. By its own admission, it will not show you how to use all of the *Select* capabilities. But it offers an excellent introduction to most of them and it takes full advantage of the ability of the computer to drill you on what you've learned.

After telling you how to install *Select* for your printer, the manual boldly states, "The best way to learn *Select* is to Put The Manual Down Now!" You are then advised to insert the Teach disk that comes with the package.

With the master disk in Drive A and the Teach disk in Drive B, you simply type T for "Teach" (see Figure 2.). After providing an explanation of Teach and what to expect when using the module, selection 1 moves you to selection 2. You are then taken through every step in a process designed to last about 90 minutes. You may also start with any of the 27 selections.

In each case, Teach defines a command ("What it does:") and gives you step-by-step instructions for executing it. It then gives you an opportunity to try without the instructions. When you're finished, the program tells you if you were right or wrong and gives you the option of going back for another try, moving on to the next subject, or returning to the Teach menu.

For your amusement and encouragement, the program provides numerous comments in a kind of mellow California style—commiserating with you when you fail, as if to say, "Hey, it's okay. Just go with the flow. Let's give it another shot," and praising you when you do well. At every juncture, you are flattered, teased, or otherwise urged to stay with the program. If you have an ounce of curiosity in your brain, you'll find it difficult resist the urge to look at just one mo Select command.

Part of the appeal of Teach, of cour is directly related to the fact that the fu damental features of *Select* are inheren easy to learn. As you progress through t Teach menu, you feel your mastery gro ing. ("Okay, I know how to do th What's next?")

But there's also the fact that almo from the moment you open the *Sel* package, you are actually using your P Is there a PC owner anywhere who c resist laying the manual aside and bo ing a new program as soon as it's out the package?

Even with glaring lapses in the man al, most secretaries or other profession who have a basic familiarity with the should be able to master the major fe tures of *Select* quickly and easily by usi *Teach*. —A

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CIRCLE 134 ON READER SERVICE CARD

key command.

The only drawback is that key files are not easy to create. You have to take time to create a single document with all of your key file information on it. You must type the information exactly as you want it to appear, and decide before you begin which function key is to be loaded with which text block.

In addition, you are limited to one key file per program disk. Obviously you can get around this by renaming various key files whenever you want to use them. But one way or another, using the function keys requires considerable preparation.

Editing and Printing

Editing text is fairly easy. The "Replace" command prompts you for the old word and the new word. When executing, the cursor will stop at each occurrence and you'll be given a "Replace? Y/N" option. The old word must be entered exactly as it appears in the text, however, and there is no "wild card" feature.

The "Erase" function allows you to move the cursor over the words you want to delete. But should you make an error, you may backspace to restore the mistakenly erased character, word, or sentence. Nothing is removed from the text until you hit the Escape key.

One especially convenient featu the provision for removing "hard car returns." These are the returns you from the keyboard to end a paragrap preserve a blank line. In other word cessing programs, they can be very c

USING THE function keys require considerable preparation.

cult to nullify. *Select* allows you to place" them with a null character.

Printing a document is also relati easy. Choosing the P option from *Select* welcome menu takes you screen that lets you enter the start p end page, number of copies desired, the like. You make your choices, hit Escape key, and follow the prompt activate the printer. *Select* also supp "Background" printing, an important ture that allows you to print one d ment while editing another.

A very important caveat: *Select* is posed to support bold, underline, and superscript printing. However, o all these, my Epson MX-80 printer Graftrax, produced only bold prin and underlining. The manufacturer unaware of this problem but promise look into it. Clearly it is something should check before buying the gram.

The program does not support o more exotic printing features such strikeout and expanded or compre printing. And there is no indication t patch script of the sort used by Word can be created.

Superspell and Merge Feature

A spelling checker and a mail m program are included as part of the s dard *Select* package. The speller co with a dictionary file containing 9 words, and it is so easy to use that you plunge in without consulting the d mentation.

The system reads the text you h created, identifies all words not in its

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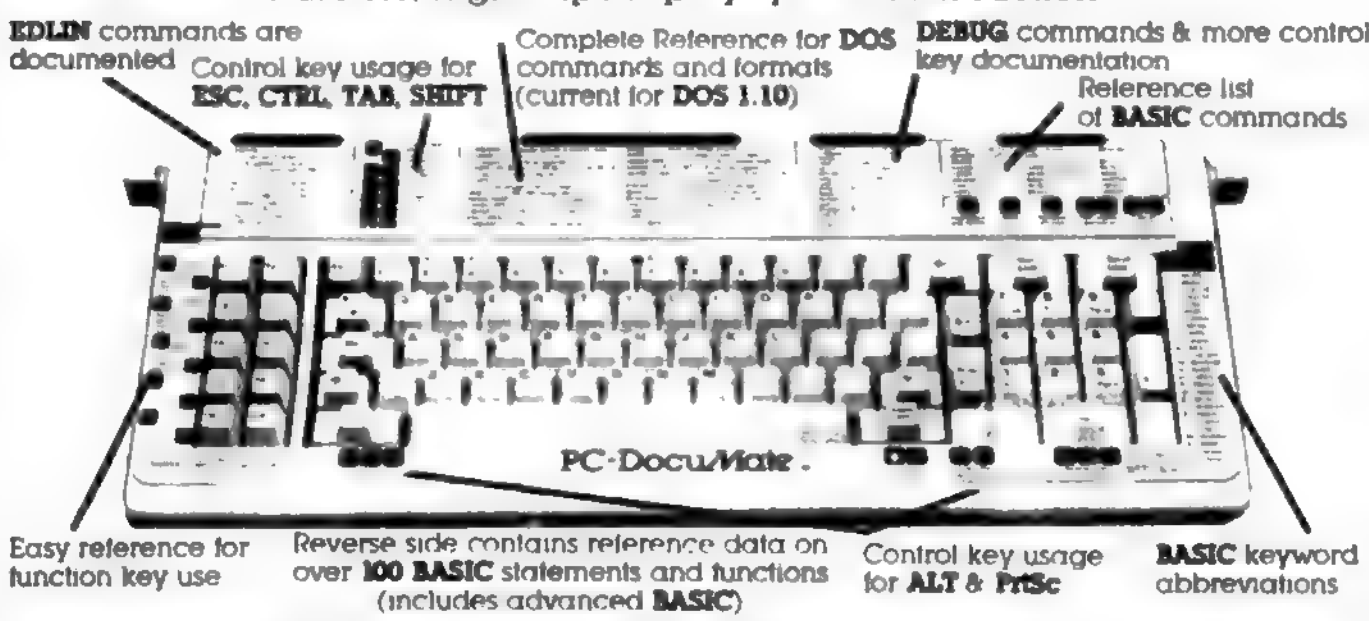
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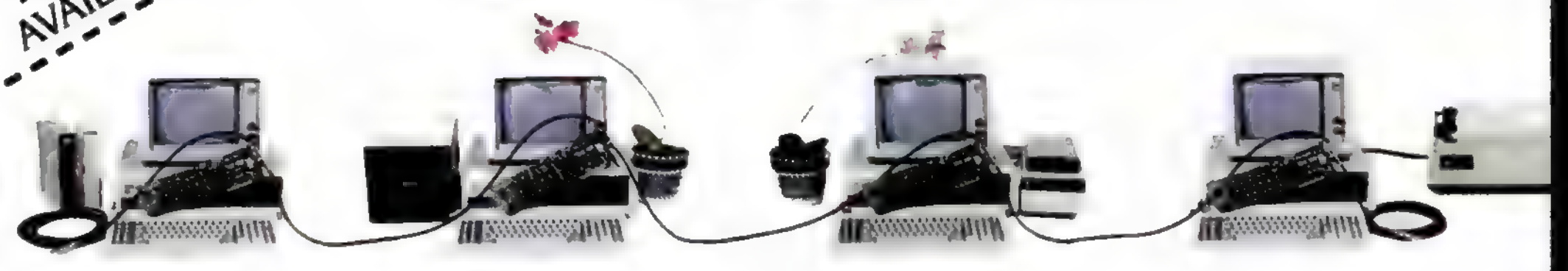
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ıry, then asks you whether you want ırk each word in the text, ignore it, or .t to the dictionary. When the identi- .on process is over, the system takes to the text and automatically ad- es the cursor to each marked word orrection.

ou can supposedly create special onaries and add and delete "dictio- sets" of words from the master dic- ıry. Unfortunately this is very poorly .mented in the manual and not men- ıd at all on-screen, either in the :rspell or the *Teach* modules.

he manual focuses exclusively on the ır torturous—and almost irrele- —process of removing inadvertently d misspelled words from a dictio- . (It would be so much simpler to the dictionary file from your master :rspell disk onto your work disk.)

othing is said about how to create a dictionary. Repeated attempts to test feature resulted in the message "Not :rspell format." An SIS customer ser- representative was unable to explain ignificance of "R—Reorganize a dic- ıry," even though it is a menu selec- in this module. Such sloppiness is aying in any product. But with a uct in this price range, aimed at this :et, it is absolutely inexcusable.

ı light of these deficiencies, it seems st trivial to point out that there is no to access a *Superspell* dictionary or lictionary module. You must always

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Superspell to proof a document

he mail merge program seems to be t standard for microcomputer word ɔssing programs, though here again, ocumentation of this important busi- feature leaves much to be desired. ly it is worthy of an entire chapter in nanual, instead of an extended and ısing description in what is other- wise a glossary of *Select* commands.

It is essentially a barebones program designed to do an adequate job of producing mailing labels and customized form letters. There seems to be no limit on the number of names and addresses you can have on a mailing list. (At least no limit is stated.)

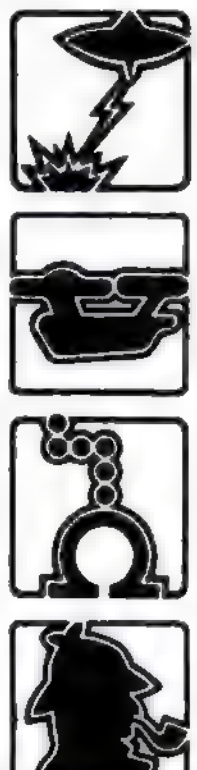
But you are limited to eight rigidly defined fields, each of which can contain only a certain number of characters. The variables and associated field lengths are: name (30), first (30) and second (30) address lines, city (24), state (2), zip code (9), phone number (13) and "reference."

The reference variable is intended to be a nickname, though the field can accommodate up to 127 characters. Thus you can produce a letter addressed to Mr. Robert Smith which opens "Dear Bob," but you cannot also include a personalized comment ("As we discussed on the phone last Thursday . . ."). Or you can include the comment and settle for "Dear Robert."

There is no way to sort or select names from your mailing list for specialized mailings, though you can go through your master list and use the *Select* word processing features to create specialized lists

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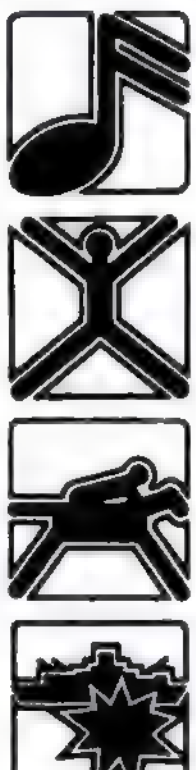
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manually.

If you need sort and select features to generate sophisticated mailing lists (printed by Zip code, targeted to qualified prospects or customers meeting certain criteria only, etc.), you should probably look into a good database management program that will let you create letters with *Select* and merge them with information from your files. As always, check before you buy.

The *Select* manual is typewritten, but the layout is crisp and easy-to-read. And SIS is to be commended for including an index. Written in a conversational, informal style, the manual represents a step in the right direction for computer documentation in general. But in many other ways it is inadequate and incomplete. There seem to be whole chunks of information missing—information one expects in a manual for a $495 word processing package. To say nothing of the fact that, as footers on every page proclaim, this is the fifth edition of the work.

The lack of information on the dictionary portion of *Superspell*, the haphazard treatment of mail merge, and an overall lack of a coherent presentation tend to outweigh the pleasant tone. It is difficult to avoid feeling that no one ever really sat down with *Select* and went through it step-by-step to produce a solid instruction book. Clearly no one ever did so for the PC version of the program.

THE MANUAL represents a step in the right direction for computer documentation in general.

The only customization for the PC is the addition of a page telling you how to make backup copies of your disks, a gle sheet at the beginning alerting yo the system requirements and one or minor inapplicable functions, plu three-word list of CP/M commands their MS-DOS equivalents.

It's not unfair to hold publisher word processing program documenta to higher standards than the rest of industry. A prospective user is natur inclined to wonder, "If your prog makes text creation and manipulatio easy, shouldn't it be a snap for yo produce a manual customized to machine?"

Other Considerations

"Printer installation," that is, the cess of customizing your copy of the gram for your particular printer, breeze. "Installation" and why it is ne sary is not explained in the manual, the instructions are easy to follow effective.

Basically, *Select* gives you an In disk with over 25 prepared prog



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patches. You merely choose your particular brand of printer when prompted, and the system does the rest.

There is one extremely important caveat, however, concerning the type of monitor you use. The review copy of *Select* would not work on a BMC monochrome monitor plugged into the color/graphics card. SIS is aware of the problem and expects to have a BMC-supporting version ready in early spring.

Select, according to SIS, was issued for the PC with support for the IBM monochrome display and for the Amdek Color II RGB monitor. If you are considering *Select* be certain that it will run on your monitor.

Select will display only 80 characters across the screen. (There is no horizontal scroll.) The right margin can be set beyond 80 to whatever limit your printer will accommodate, but on the screen, the text will wrap around onto the next line.

There is no provision for hyphenation. Columns of text can be moved from one part of the page to another, but there is no special feature to make this easier.

Select runs fast. With 128K, the minimum requirement, disk access is kept to a minimum. You access your disks only to bring in a file or the text loaded into one of the function keys.

If you have a memory board capable of functioning as an electronic disk, you can load the entire *Select* program or text files into RAM and access the disks only to save a document.

IF YOU ARE considering Select be certain that it will run on your monitor.

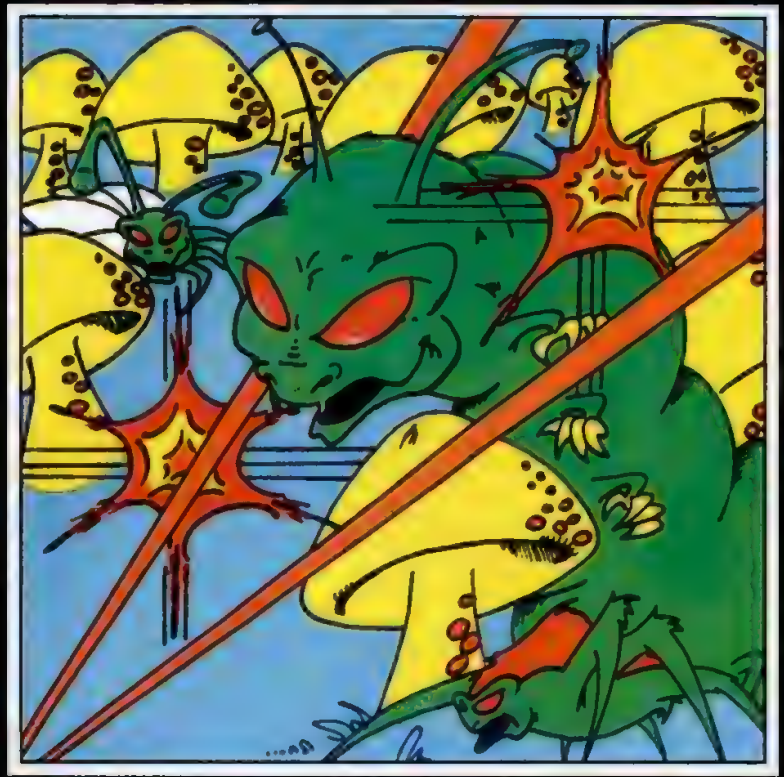
There is also a typing buffer, making it impossible for you to beat the machine. Everything you type appears quickly short, the program runs very smooth

Select is a well-designed, easy to l word processing program that—poss because it is so easy to learn—is also to use. It does not offer all of the featu word processor might offer, but pros tive purchasers must ask themselv they will really use all of the whistles bells found in other programs, particu ly if they make the program more diffi to master.

The manual, unfortunately, does reflect the same care that so clearly into designing the program itself. As the manual presents some aggravat and largely inexcusable, problems.

In general, however, *Select* is a s program, the product of a different processing philosophy than the th behind *WordStar*. It is certain to fi large market among PC users. Finall its newly reduced suggested retail p of $495, this word processor/spel checker/mail merge package repres an excellent value.

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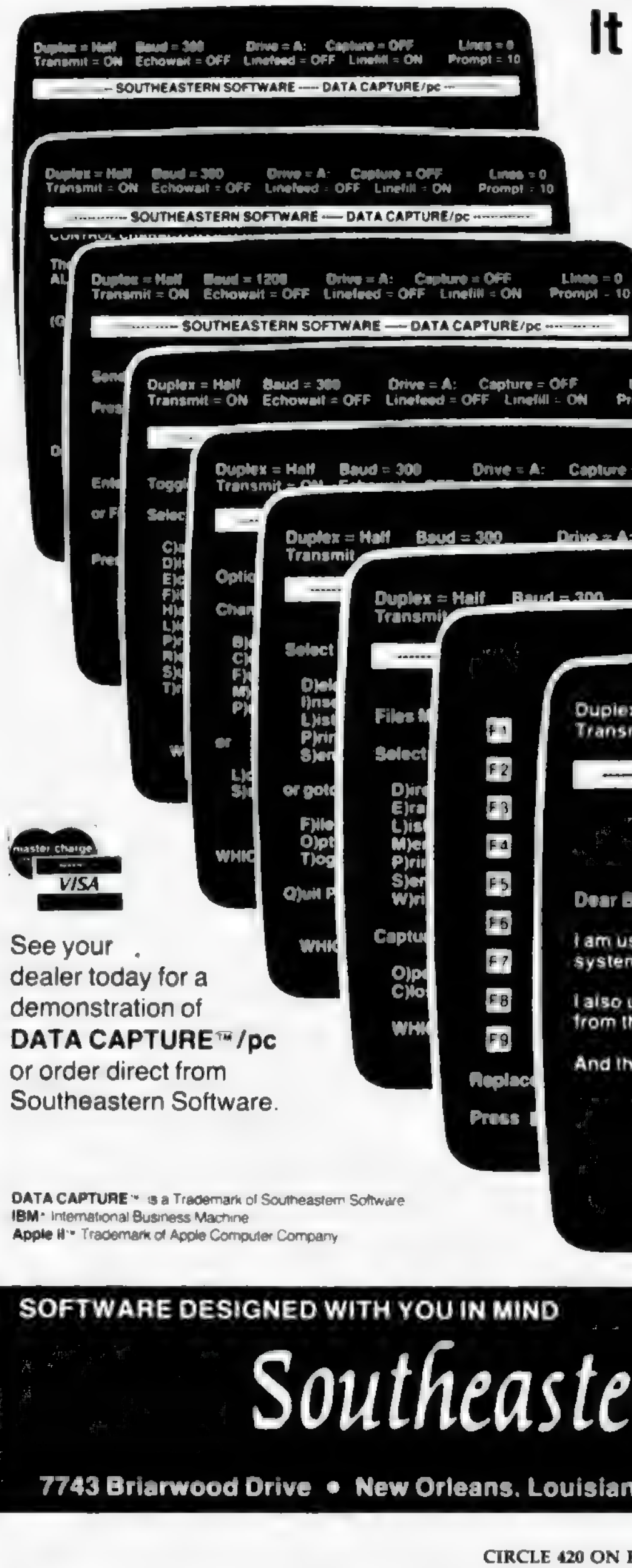
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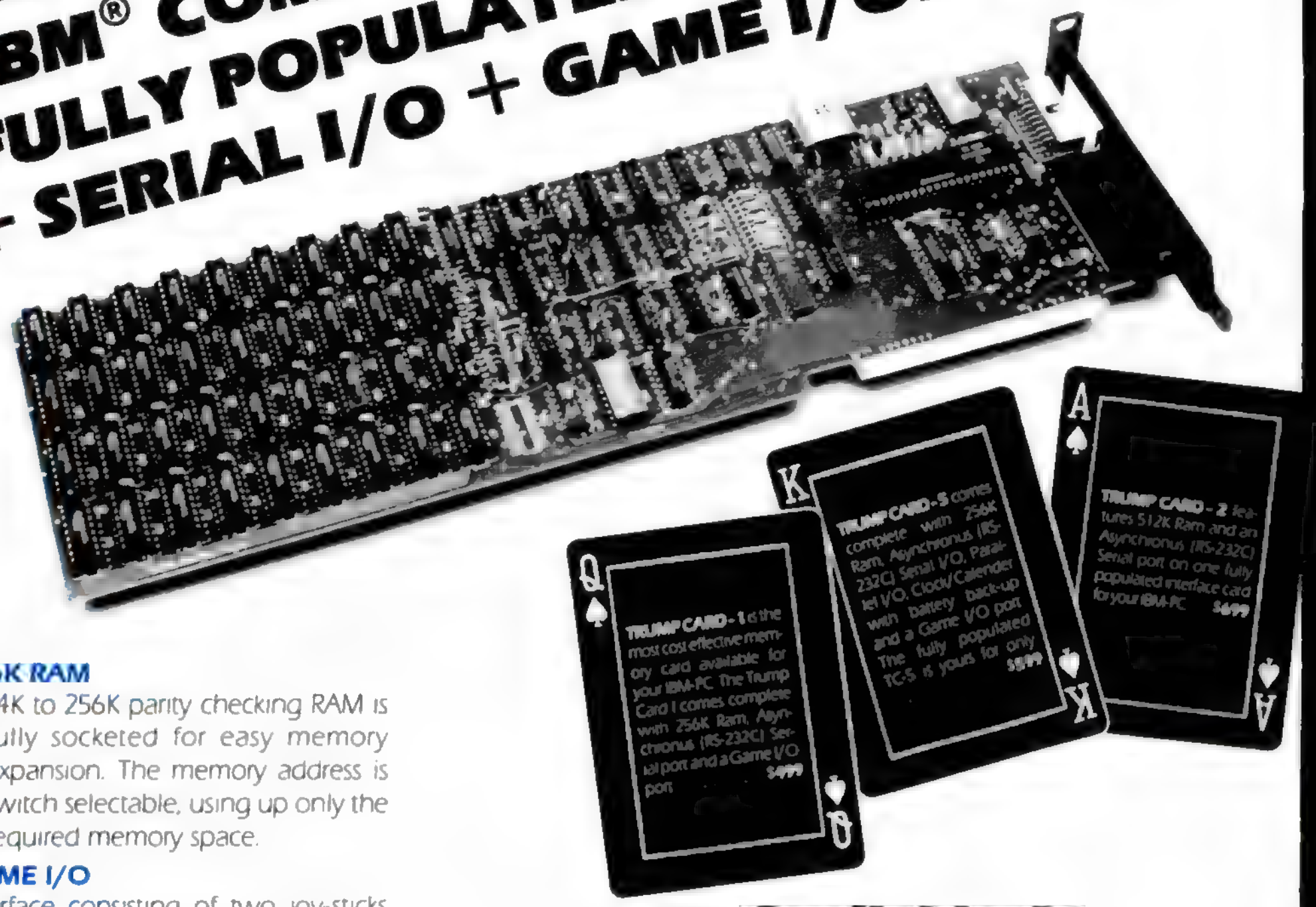
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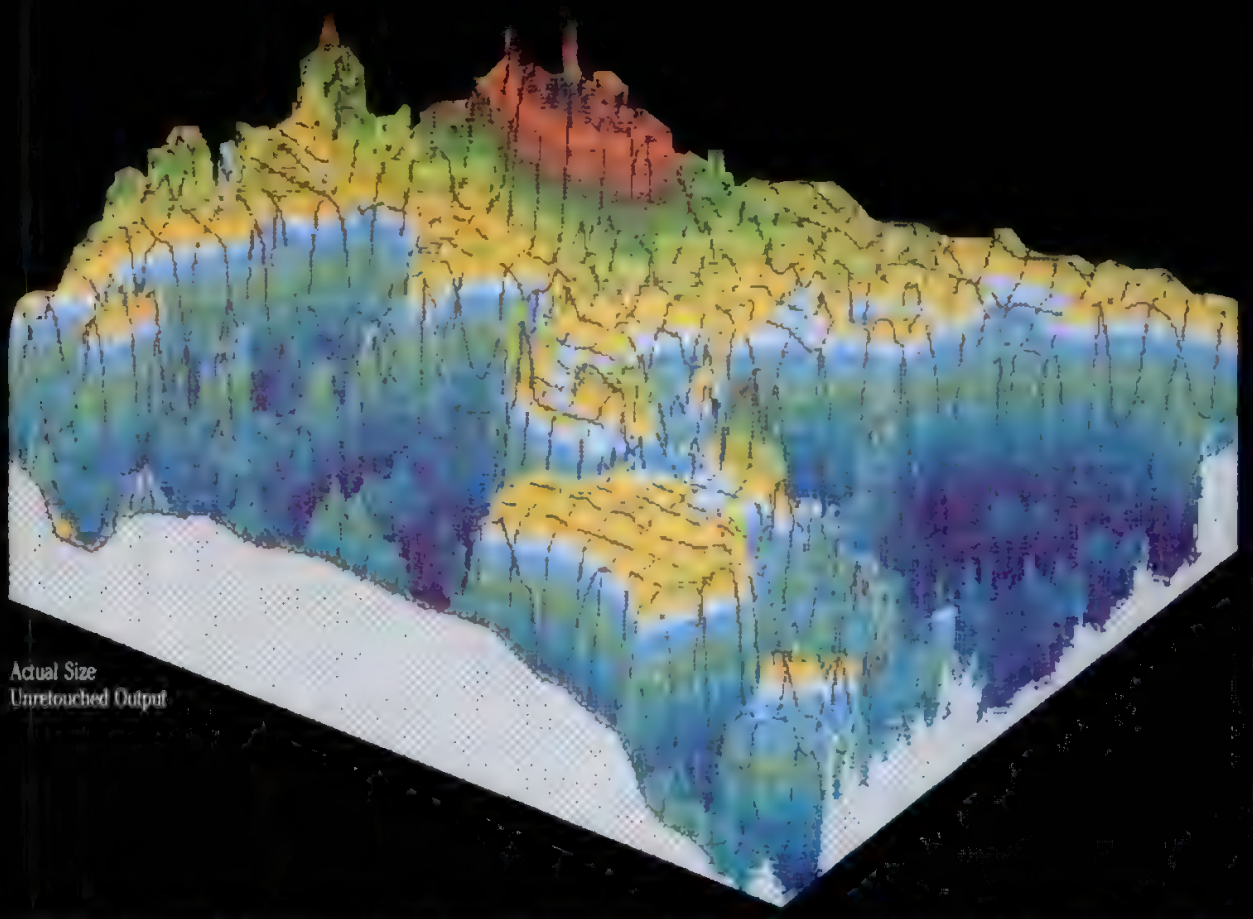
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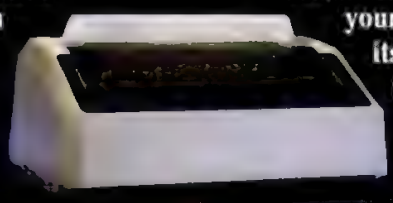
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BUSINESS/PAUL SOMERSON

Le PC has just introduced itself to the French. Despite obstacles that face all immigrants, the future looks rosé.

Parlez-Vous P.C.?

On January 19, IBM announced that it was officially introducing the PC into most of Europe, as well as several other points east. An American-born Frenchman named Joel Dean, Jr. couldn't be happier.

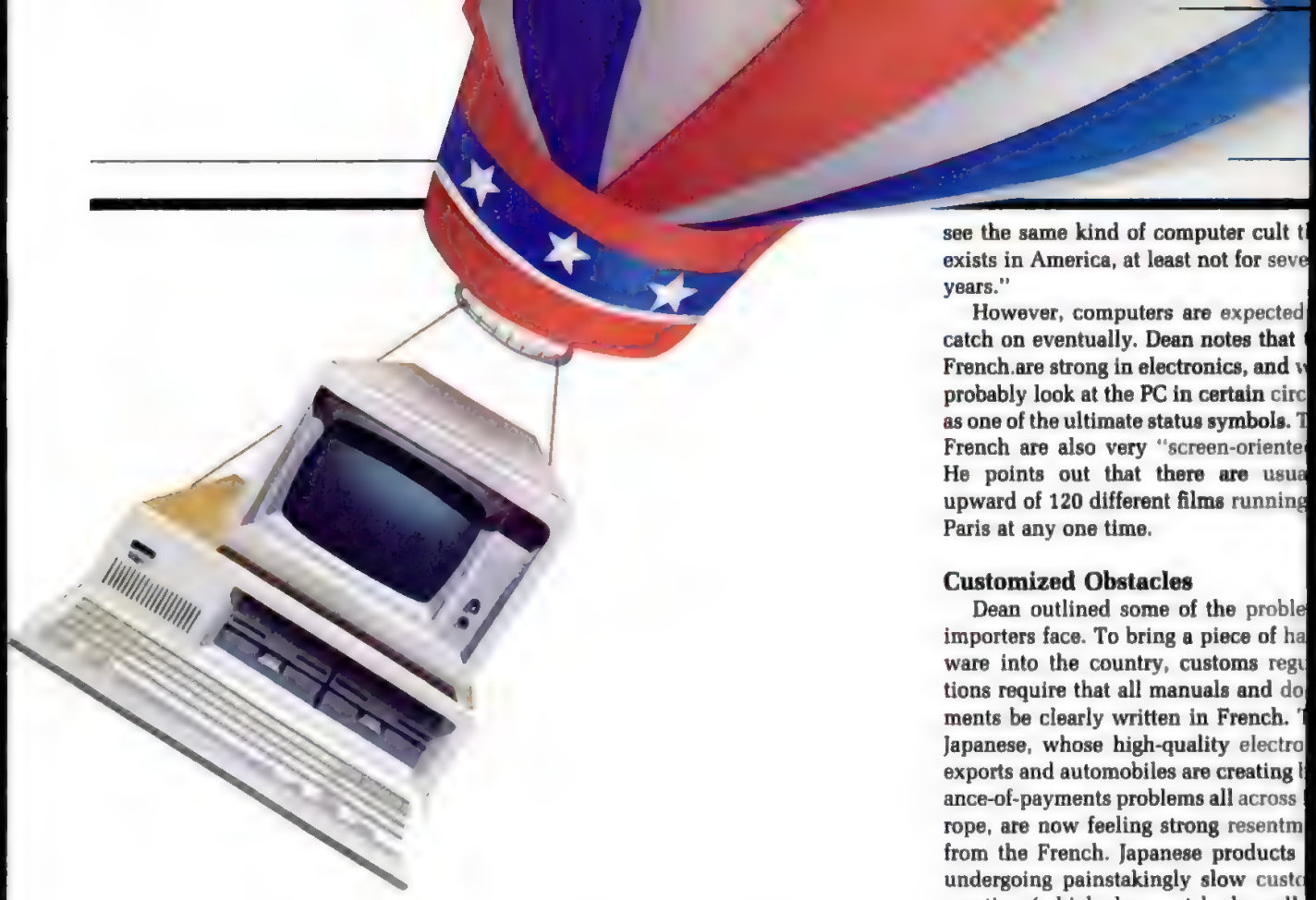
Dean offered his views on the computer market from his turn-of-the-century art deco office in Paris, with its gently curving windows, sculptured stone walls, and shimmering mosaic interiors. He is marketing director of Softec, a company created to "translate and transpose" existing software for the PC into versions the French can use. As he puts it, "This is a tremendous opportunity for people who want to ride the IBM wave. The market is fertile, and now is the right time to get into it."

Dean has been introducing new American technologies into France for the past two decades. He brought over the first coin-operated laundries and dry cleaning stores. In fact, IBM's new PC store in Paris's Montparnasse skyscraper overlooks his first self-service laundromat. Later Dean became involved with security devices, distributing equipment that ranged from burglar and fire alarms to sophisticated access control and identification systems.

It was during this venture that Dean initially became acquainted with some of the problems foreign computer companies would face. "The French are intensely nationalistic, and are becoming mo so as the world economy worsens. IBM fortunate in that it has been so we entrenched for so long," Dean plained.







Big Bleu in France

IBM has been in France for quite some time, selling office equipment and its larger computers. According to Dean, "IBM is a magic word in France. There is no company there that is better known or respected. In fact, many Frenchmen believe 'La Companie IBM,' as it's called, is actually a French firm."

The microcomputer industry in France, however, is relatively new. Commodore made the earliest inroads, and was successful enough that Apple and Tandy soon followed, along with Victor and several others. But they soon found that the overseas market was far different from the domestic market. European nationalism and problems posed by customs regulations, language barriers, and additional expenses can affect the success of non-European products.

IBM will be selling the PC in Paris at about the same price it charges here, which puts it out of reach of the average citizen. "In France," Dean explains, "there is a group of relatively wealthy professionals and executives who may be attracted to it." But while there are millions of moderately well-off Americans with enough disposable income to afford a PC, the same is not true in France.

"This means there will be relatively few initial purchasers, and most of these will be doctors, lawyers, executives, and company owners who will buy PCs not for specific applications, but as curiosities, to learn what all the fuss is about. Most of the prospective customers were astonished when *Time* magazine made the computer 'Machine of the Year.' And micros made a big hit at the Fall 1982 SICOB, the annual office products show in Paris.

"But while the French won't purchase PCs initially for their businesses, it's only a matter of time before they begin to grasp the financial and organizational power of micros and begin to use them at the office," Dean predicts.

Interestingly, he suspects that French children will immediately see the potential of PCs, and will learn to operate them better than their parents. In France, the level of mathematics instruction is very high—probably higher than in America, according to Dean—and even young children should have few troubles with some of the thornier operating principles.

Still, it will be a long time before the average *lycée* has its own PC. The French educational system is very traditional, and technological advances are not viewed with the enthusiasm that is common here. Dean predicts that "you won't see the same kind of computer cult t exists in America, at least not for seve years."

However, computers are expected catch on eventually. Dean notes that French are strong in electronics, and v probably look at the PC in certain circ as one of the ultimate status symbols. T French are also very "screen-oriente He points out that there are usua upward of 120 different films running Paris at any one time.

Customized Obstacles

Dean outlined some of the proble importers face. To bring a piece of ha ware into the country, customs regu tions require that all manuals and do ments be clearly written in French. T Japanese, whose high-quality electro exports and automobiles are creating b ance-of-payments problems all across rope, are now feeling strong resentm from the French. Japanese products undergoing painstakingly slow custo scrutiny (which does not bode well Japan's IBM look-alikes). Dean poin out that even when he was importing few as one or two ultrasophistica access control systems per year, offic would meticulously examine his leng manuals page by page to see if they c plied with French regulations.

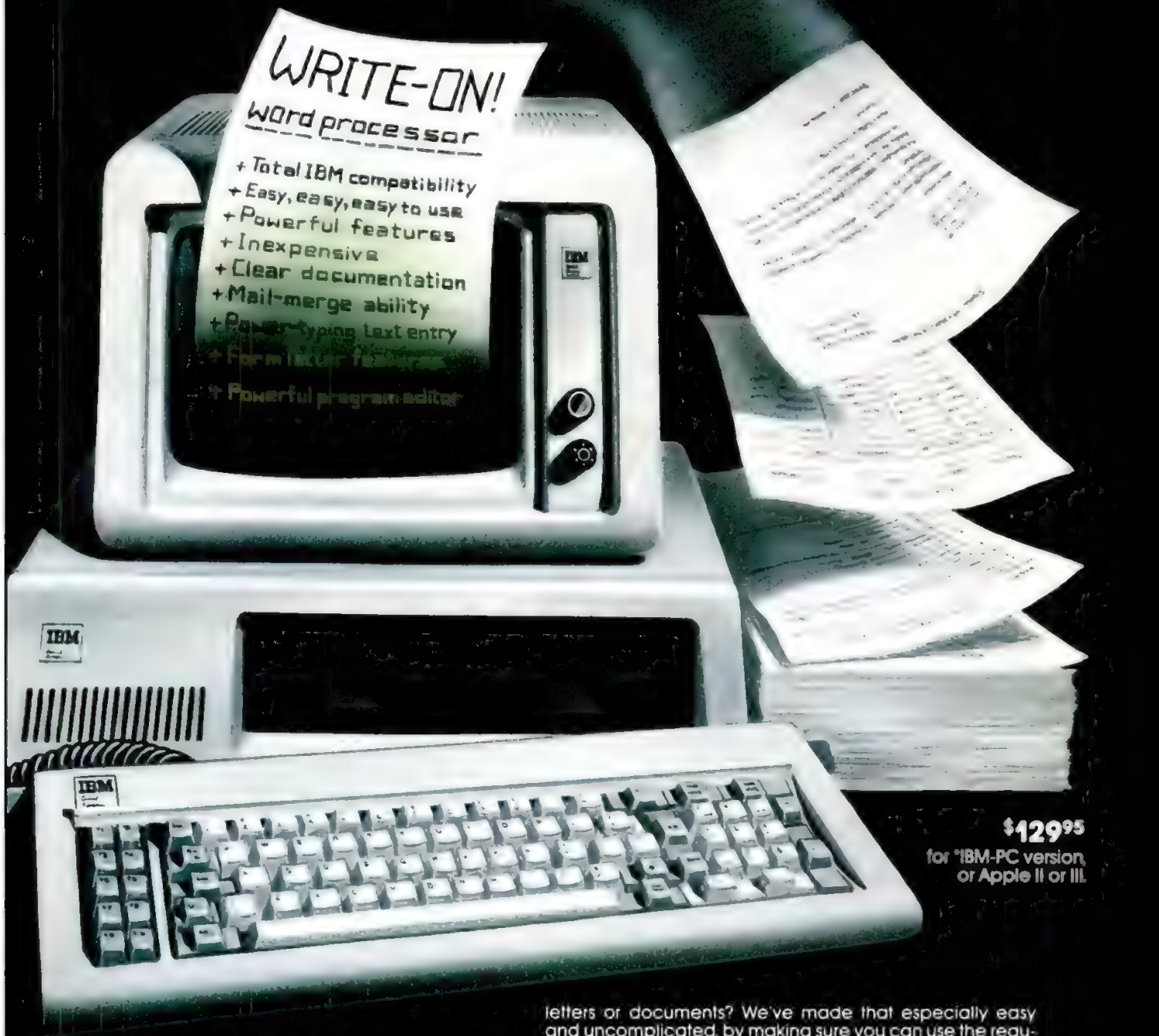
Last year when the PC first began m ing headlines in the United States, D became interested in bringing PC-co patible software into France. "IBM ha

THE FRENCH children will immediately see the potential of PCs.

world strategy in mind when it brou out its micro," he observed. "It has o ations all across Europe, and rece test-marketed the PC in Holland. Mos its domestic products have eventu appeared overseas."

Dean contacted Camilo Wilson, had created one of the PC's notable e successes with *Volkswriter*, a powe but easily learned word processing

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gram. Wilson, a native-born Chilean, l
also felt that there would soon be a n
for a PC-based word processor in a l
guage other than English.

The first product Dean has announ
is Wilson's new multilingual version
Volkswriter, which will handle text
French, English, Italian, Spanish, a
German. It will have menus in each l

MANY Frenchmen believe 'L Companie IBM,' as it called, is actually a French firm.

guage, and will operate on the keyboa
used in the different countries.

The keyboards in each country di
slightly, explained Dean. The French
sion has four or five keys in different l
tions than American hardware, as wel
six special language keys. Each cou
has its own accents and punctua
marks, which cause headaches for
software designer.

The new version of *Volkswriter*
sell for the equivalent of $225, giv
Dean's retailers what he hopes will
instant and thorough market penetrat
The cost of doing business in Europ
much higher than in the United St
and, while the French will slowly s
producing their own software, Dean f
they won't be able to match *Volkswrit*
abilities and proven ease of use—o
relatively low price.

PC Software in Europe

Softec is also negotiating with a m
software manufacturer in the Un
States to produce a full European lin
integrated text processors, mailing
grams, and spreadsheets. It is not p
ning to introduce accounting softwar
European accounting systems are
stantially different from those in the U
ed States. Accounting practices even
from one European country to anot
Dean speculates that the first progr
the French create themselves may be

unting.
)ne of Dean's immediate goals is to te a 50,000-word machine-readable ıch spelling dictionary to accompany ext processors. He would like to find olid English/French/English transla- package, but thinks a workable one is ng way off. He is also eager to intro- e games to French PC owners. While de screen-games are only slowly oming popular, American pinball has been a staple of French café society. l games require only minimum trans- on—often only the French equivalent Hit Enter key to begin." For obvious ons, text adventure games are further m on his list.

)ean is currently looking for Ameri- IBM PC software companies—espe- ly small and middle-sized firms (the ıstry giants have their own distribu- networks)—seeking outlets for their ducts in French-speaking countries could perform the necessary transla- s themselves.

Softec plans to distribute relatively titles and spend a considerable unt of effort to earn each one a high ket share. It will provide extensive ertising and a comprehensive custom- upport program complete with hot- s and American-trained service per- nel.

)ean is also in the market for certain lware items. "The French like to buy ssories," he says. But he's not inter-

IBM IS A agic word in France.

d in dust covers or furniture, "just s that will encourage them to pur- e more software." IBM has outlets in ally every important city and town of size in France. Softec will cover the e territory, and sell in Luxembourg, ium, and the French-speaking areas witzerland and Africa.

bles and Crème

We're the only startup organization rance for the PC at present," Dean , "although I predict there will soon flood of competitors. International marketing is not as hard as people think it is, and there are a great many opportunities right now."

"Apple, and to a lesser degree, Commodore, have dramatically illustrated that there is a thriving market for translated software. And similar operations are already starting in the neighboring European countries. The PC will be the cream of the market for years to come, and because of its entrenched position in French culture and society, IBM will almost certainly succeed," Dean observes.

"We at Softec are eager to follow IBM's successes with our own, and would be delighted to hear from American software producers with programs they think the French would like." Dean has reason to feel confident. Not only is IBM almost universally respected in France, but it happened to choose as its PC trademark an American symbol the French find most appealing: Charlie Chaplin's little tramp. */PC*

For more information, contact Joel Dean, Jr., Softec, 2 Rue Paul Saunière, 75016 Paris, France; Phone: 33-1-504 3030, Telex: 620000.



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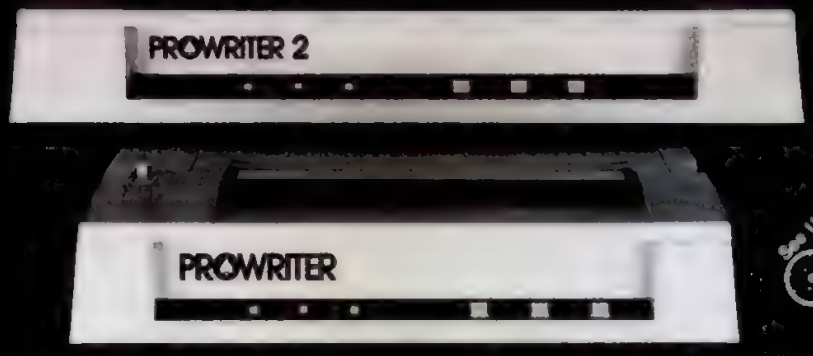
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A spreadsheet war between *VisiCalc* and *SuperCalc* was publicized by this magazine several months ago. At that time, these programs were the big guns while *MultiPlan* was touted as the challenger. Since then, two newcomers have joined the fray: *Target Financial Modeling (TFM)* from Comshare and *MicroPlan (MP)* from Chang Laboratories.

What is interesting here is that these latest programs seem to have raised the power of the spreadsheet program to a higher level. Neither is a "me too" program. Instead of trying to capture a small portion of the market with a version that mimics like their predecessors', both companies have augmented the power and enhanced the ease of use of existing programs. Both offer more tools to create financial models and projections.

Similarities

Both *TFM* and *MP* have an arsenal of commands to set up income statements, balance sheets, and all the other normal spreadsheet applications. They have commands to create tax bracket calculations, different kinds of depreciation, consolidations of corporate subdivisions, variance reporting, *pro forma* analysis, and much more high-powered financial modeling. Calculations that took several steps and wasted rows in other spreadsheet programs are now built-in single commands. Extended help prompts that cut down the time spent flipping through

manuals are available with a few keystrokes. Each manufacturer also recognized the large following of CP/M-86 and MDOS and provided their packages in both flavors.

Differences

The philosophies taken by each company on how its spreadsheet would work are different. *TFM* benefited from the time invested in increasing the power compared to existing spreadsheets, but most of the designers' effort was spent on creating a package that was versatile and very easy to use. The commands use more straightforward English than any other package I have seen, complete with standard nouns, verbs, and adjectives. On the other hand, *MP* reflects a major effort to include a vast array of commands that offer a great amount of spreadsheet power at your fingertips.

TFM provides two ways to enter a table, depending on the style and preference of the user. You can enter data into the spreadsheet columns and rows directly, or you can enter your commands one line at a time similar to the way you would write a BASIC program. *TFM* includes a small editor to change the commands and arguments. *MP* has the same spreadsheet "program" option to a degree, but it is more of a "prompting" input system. In *MP*, after each command is entered, you have to answer all the prompts for the command arguments. If a command needs changing, the entire command has to be deleted and reentered. Many of the differences are related to style. Taking a closer look at each package reveals their strengths and weaknesses.

THE COMMANDS use more straightforward English than any other package I have seen.

Target Financial Marketing

Both the CP/M-86 and MDOS versions of *TFM* require that you have 128K RAM and at least one disk drive. However, two drives make life much easier. The second drive allows for larger table sizes and lets you Consolidate several separate tables into one combined table. With one drive this consolidation feature is severely hampered.

TFM will work with many different display terminals and printers. If it doesn't, an installation program is provided to match your terminal or printer to the spreadsheet. I had to use the installation program to set up my F9 function key as the Execute key and F10 as the Help key. (This worked fine once I realized that to "install" those key assignments permanently I had to make the changes and then reboot the PC.)

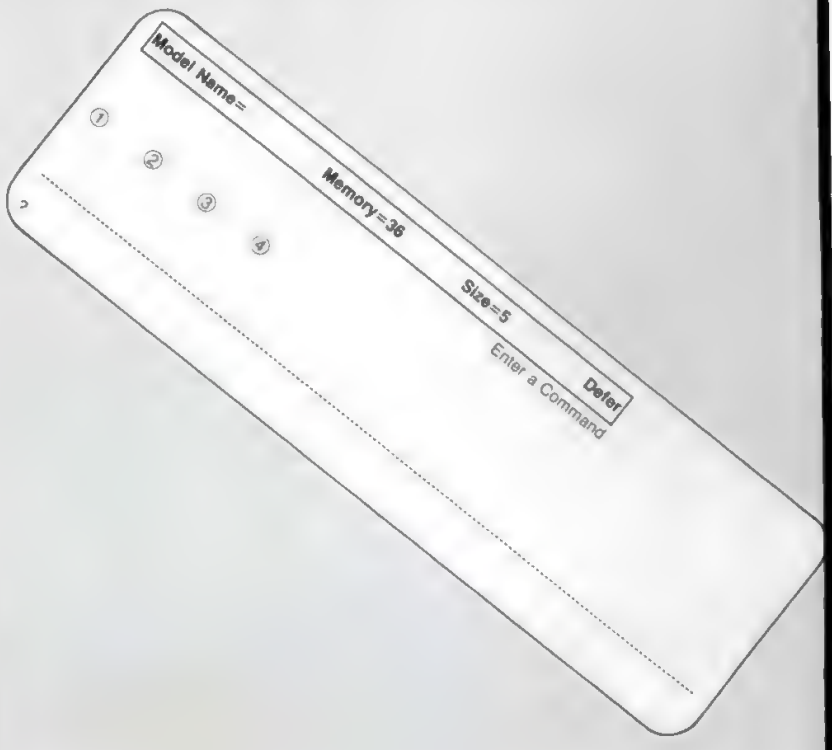
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Figure 1: Screen for the Target Financial Modeling program.



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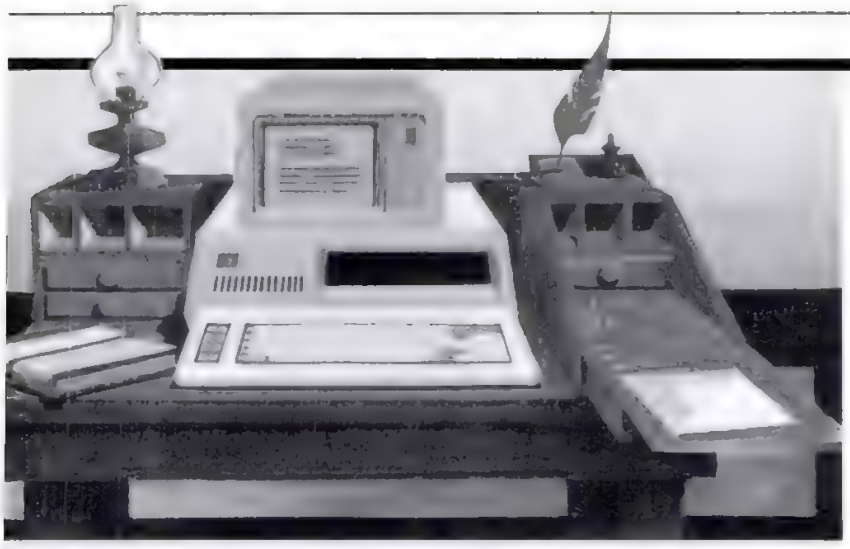


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Pro Forma Financial Statements
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These models plus a few more are
ady set up on the applications disk. I
d a couple of them and they work well.
ability to Input data into a previously
ed model makes repeating the same
lysis on many different sets of data
. The output commands and format
capabilities produce a quality report. *TFM* allows you to output the table to an ASCII file if you want to read it into a word processor to make the report look even better. This would be advisable with reports that have a lot of headings, subheadings, and footnotes. I tried this with a report entered into the *Benchmark* word processor, and everything worked well together.

There are two ways to create a spreadsheet with *TFM*. First is by entering data into the table directly; second is by entering the table commands one line at a time, "programming" style, in a language fairly close to English. Before I explain this option, however, let's see how the screen looks when you first enter *TFM* (see Figure 1). The top line is the guideline (1) and shows the current model name, amount of memory left, number of columns currently specified, and the calculation mode (deferred or immediate). The next line is the status line (2), which

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prompts you when you need to enter a command or data. The next 18 lines (3) are the display area where the table is created and displayed. The last line is called the cursor line (4). It is where the commands are displayed when entered, and is also where a command to be changed appears during the editing mode.

TFM PROVIDES various options for printing or storing your work on disk.

The two different ways to enter a table are Model Summary and Results. In the Model Summary mode you enter the commands into the display area, editing them as necessary. When you are finished or want to check what you have entered so far, you can switch to Results to see what the table looks like. This display is more like the standard spreadsheets. The example given in Figure 2 makes this clearer: It shows the Model Summary commands needed to create a "Cost of Goods Sold" schedule for the four quarters of the year. Switching to the Results mode produces a different screen (see Figure 3).

These two entry systems are updated simultaneously, regardless of which system is in current use. Any changes or additions made while in Results are automatically added to Model Summary and vice versa.

In both Model Summary and Results there are two modes for entering commands or editing commands. To enter commands, you must be in the Command Mode, while to edit existing commands you have to switch to the Display Mode. In Display Mode, you move the locator or cursor to the spreadsheet cell (in Results) or the command (in Model) and press the carriage return. The contents of the cell or command are moved down to the cursor line. You can then insert, delete, or replace part or all of that command. The locator is in reverse video and is the length of the column it is located on. makes for easy identification of the ce command in question. The position o locator is moved quickly with the GO command, or the four arrow keys ca used to move one column or row time.

TFM allows a very large table of da you have the RAM to hold it. The spr sheet can have up to 999 columns 5000 rows. You can have 198 line headings and footnotes, each up to characters. You can specify indivi column widths from 1 to 30 charac and up to 30 spaces between colun The spacing specified between colu can be global (for all columns) or jus certain columns. The choice of specif a format for just one row (column) o the rows (columns) is typical of mos the commands in *TFM*. You can cho up to 28 decimal places per value for play and from 2 to 20 significant digit calculations.

Commands

TFM has versatile English-orien command vocabulary in the Model S mary mode. For example, the first lin my model in Figure 2 reads: Heading Cost of Goods Sold. The command ca entered exactly as it reads or it can entered as follows: Heading 1 is Cos Goods Sold. Any assignment statem for columns, rows, headings, subhe ings, and footnotes can use =, is, or Line 3.0 in my example is a comman sum lines 1.0 thru 2.5 into the row ti

ROWS AND columns can be rearranged in any order or ignored if desired.

"Cost of Goods Sold." Most spreadshe would have you enter the beginning to sum, then the ending row to sum, so forth. In *TFM*, you merely type command in English: SUM OF RAW'M TERIAL THRU DEPREC'EXP. You also enter that statement with line nu

Figure 2: Example of the TFM "Model Summary" mode.

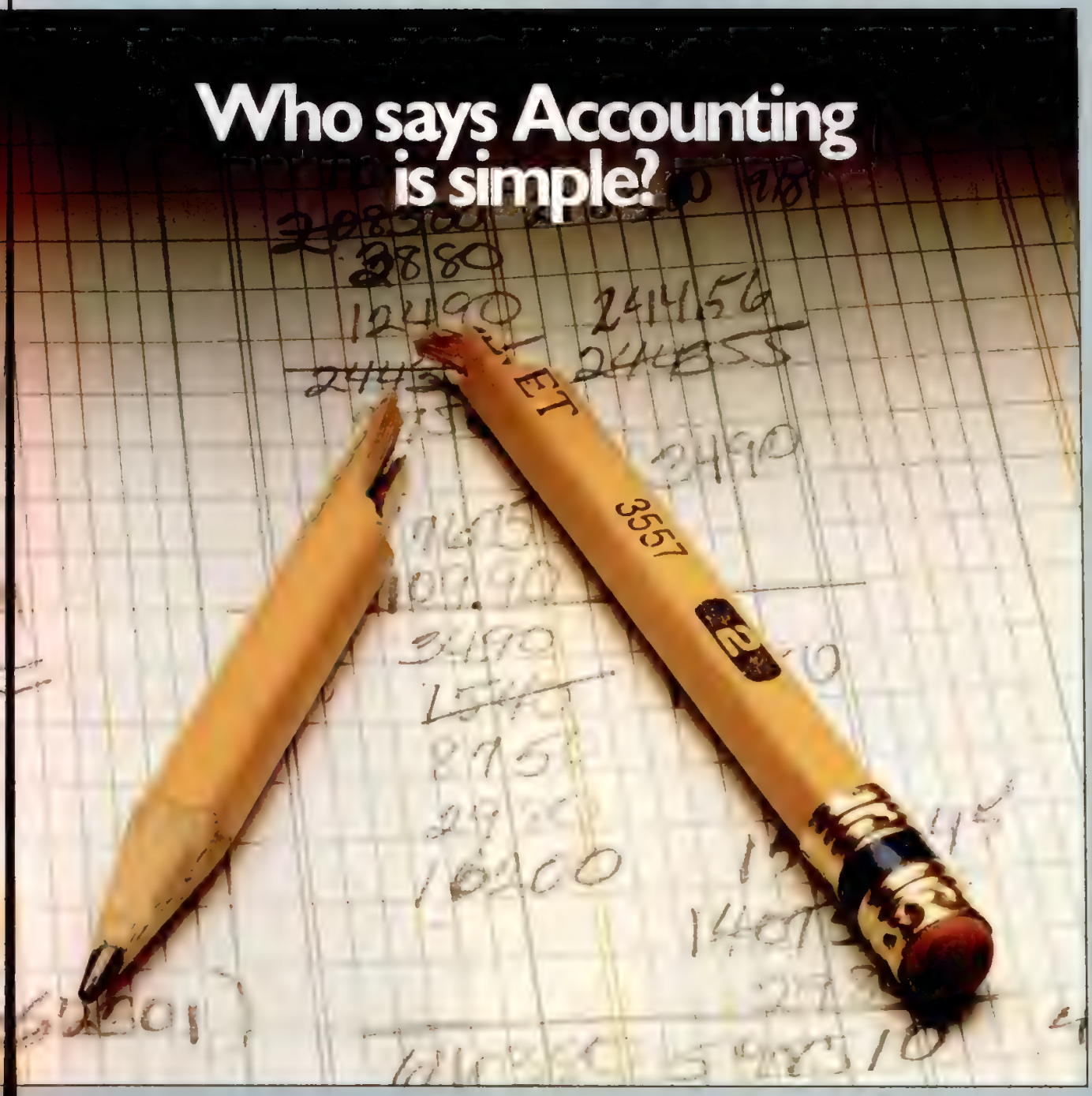
```
Heading 1 = Cost of Goods Sold
Center Heading 1
Heading 2 = 1983
Center Heading 2
Column 1 SPRING "Spring" =
Column 2 SUMMER "Summer" =
Column 3 FALL "Fall" =
Column 4 WINTER "Winter" =
Line 1.0 RAW'MATERIAL "Raw Material" =1000,1500 for 2,2000
Line 2.0 LABOR "Labor" =500,GROW BY 100
Line 2.5 DEPREC'EXP "Depreciation Expense" = 450,GROW BY 6%
UNDERLINE LINE 2.5
Line 3.0 COST'GOODS'S "Total Cost of Goods" = SUM OF RAW'MATERIAL
    THRU DEPREC'EXP
UNDERLINE LINE 3 WITH =
```

Figure 3: Example of the TFM "Results" mode.

Cost of Goods Sold
1983

	SPRING	SUMMER	FALL	WINTER
1.0 RAW'MATERIAL	1000	1500	1500	2000
2.0 LABOR	500	600	700	800
2.5 DEPREC'EXP	450	477	506	536
3.0 COST'GOODS'S	1950	2577	2706	3336

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bers instead of row titles: SUM OF LINE 1.0 THRU LINE 2.5. This makes reading a model program written by someone else (or even one of yours written a while back) much easier.

ALL THE financial data for creating the Income Statement, Balance Sheet, and Cash Flow Statement can be put into one table and printed out as three separate reports.

There are two basic categories of commands in *TFM*: data commands, which affect the numbers in the table; and format commands, which affect the way your model looks on the screen and the printer. Let's look at data commands first. The standard math commands are provided: addition (+), subtraction (−), division (/), multiplication (*), negation (−), exponentiation (X**Y or X^Y), natural log (LN), and power of e (EXP). Other commands are Greater Of, Lesser Of, Max (Maximum of), Min (Minimum of), Ave (Average of), Cum (Cumulative), Integer (Truncate fractional parts), Sum Of/Thru, and If/Then/Else. Let's say that the tax rate is as follows:

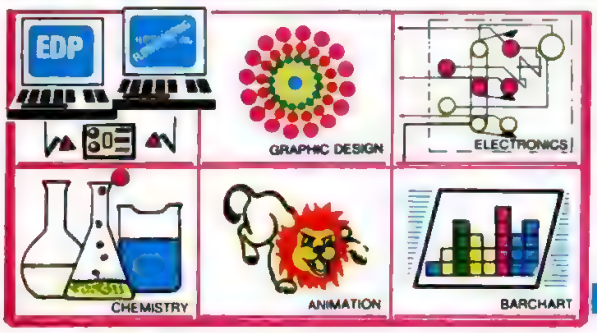
Net Income	Tax Rate
$50,000+	50%
$30,000–$50,000	30%
$1–$30,000	20%
0	0%

The statement to calculate the taxes due after determining your income would be:

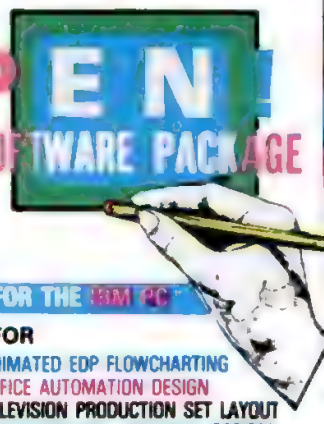
```
LINE 22.0  TAXES = IF INCOME >
           50000 THEN INCOME *
           50%
ELSE IF INCOME >= 30000 THEN
           INCOME * 30%
ELSE IF INCOME >= 1 THEN INCO
           * 20%
ELSE 0.
```

Another important command is Gro By. Numbers can be entered into the tabl as constants, or you can use the Grow B command to enter a base value and hav

THE ERASE command deletes old or unnecessary tables.



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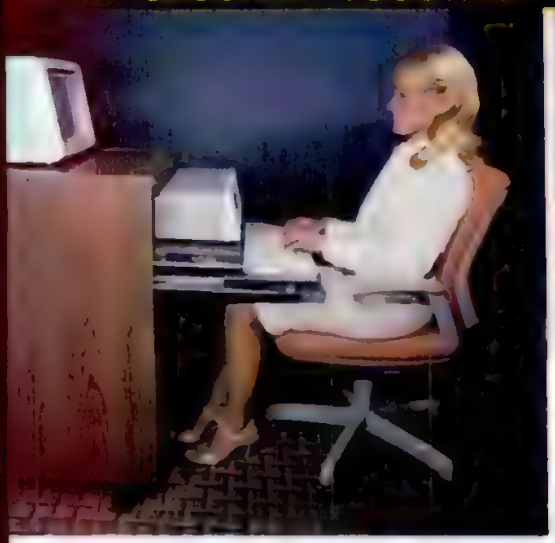
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hat value automatically incremented by a percentage rate or a constant. The first number is entered into the table along with the percentage rate (X%) or increment value (+X) that the number will grow by. You may not want all the defined rows or columns to be affected by Grow By; in this case tack For X onto the statement where X equals the number of rows or columns that you want affected.

Two final data commands are Input and Keep. Input is used when data is entered in a model that will be used for repetitive analysis. Anytime the model is processed or calculated, *TFM* will stop and prompt you to enter the data. Entering the Keep On command "keeps" the last number entered for Input in memory, and the program stops asking for new information each time the model is calculated. Keep On is automatically reset when you leave *TFM*; you can reset it within the system by entering Keep Off.

Formatting the screen and printer output is easy. Referring to Figure 2, the row or column name in caps is what appears on the screen, and the name in quotes is what is printed. You can define up to 198 headings and footnotes, each up to 240 characters long. Even though only the top three headings are shown on the screen, all of them will be printed. Subheadings

COMMANDS that could be destructive to existing data always warn you so you do not do something unintended.

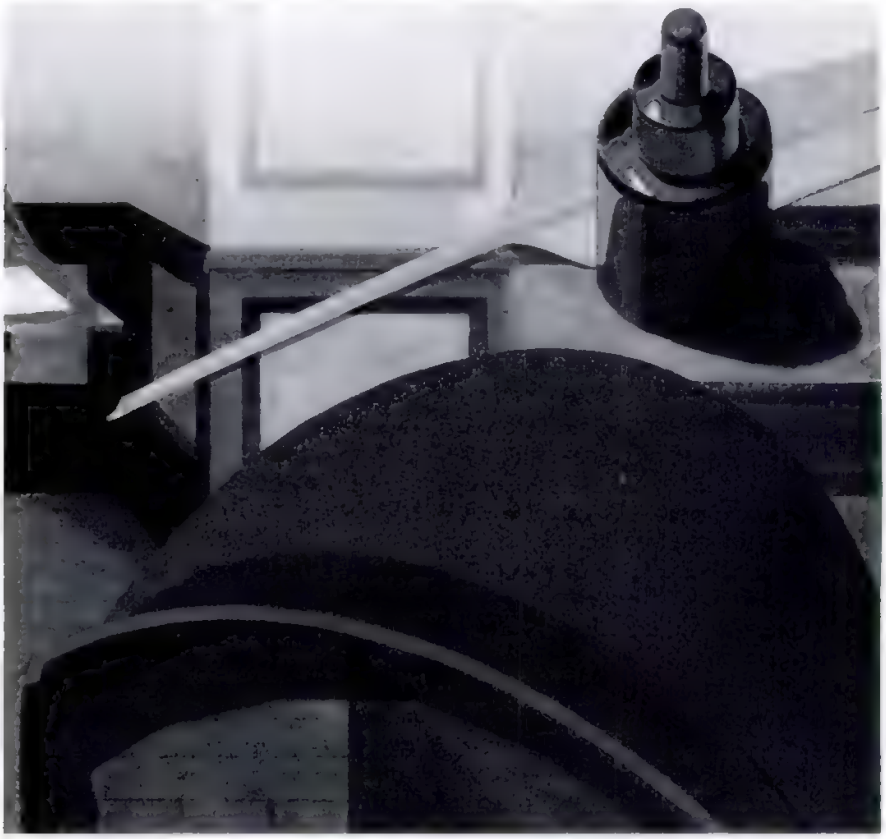
can be inserted in the middle of the model, but unfortunately they cannot be centered or placed more than one to a line.

The command Show With $ is used to display dollar signs. Similarly this command can be used to display commas and parentheses (for negative numbers). To define the number of decimal places, you use a command such as Decimals Are 3. All values can be shown with the chosen options or you can selectively choose particular rows and columns. But you cannot define these and similar options over a range of rows (columns). Currently, if you want to show half of the rows with two decimal places, you have to assign each individual row using a command such as Decimals Are 2 For Line 12.0. A command such as Underline Line 12 With x and Overline Line 12 With x prints a row of x under or over line 12 where x is any keyboard character. Entering Skip n After lets you space between lines where n is the number of lines to skip. You can jump to the next page using the Page command. Even though the various format commands create a nice-looking printout, they tend to fill up the screen so that fewer rows of information are shown at one time. To turn off the formats temporarily so that they will not show on the screen, press Formats Off. Formats On returns the format commands to the active state again.

Report Generation

TFM provides various options for printing or storing your work on disk. Entering the Print command brings up a print menu. Rows and columns can be rearranged in any order or ignored if desired. You can choose which headings to print and whether or not to include footnotes. These options allow you to build a large combined table of information, yet print it out in separate parts. For example, all the financial data for creating the Income Statement, Balance Sheet, and Cash Flow Statement can be put into one table and printed out as three separate reports. The print options selected can be saved under a report name and recalled later for the same type of report.

A WHOLE group of expenses can be judged against future cash flows for investment analysis.



It's possible to print the Results spreadsheet, the Model Summary of commands, or both. Row name titles or titles enclosed in quotes can be printed. You can choose to have the format commands active or inactive during the printout. Page length, number of line feeds, top of form, number of lines in the top and bottom margin, page width, and whether or not to use continuous forms are all selectable from the print menu. There is even a conditional print option. For example, if a spreadsheet cell value is negative, then do not print.

THE MANUAL IS very well written with lots of examples.

The Device option in the print menu allows you to select a device different from the printer (default device). Thus you can output the table to a disk file for later use with a word processor. A table sent to disk is in ASCII form and cannot be reentered into spreadsheet.

File Management

TFM keeps track of all tables by tagging "TGT" onto the end of file names. For instance, the table named Winncoin is stored on disk as WINNCOIN.TGT. This allows the program to show only the file names of tables when the Directory command is entered. The Erase command deletes old or unnecessary tables. You can review or modify a previously stored table by RECALLing it into *TFM*. And of course, entering Save file name will store the curent table onto disk with the specified name. If you want to clear the screen for a new table, you type in Create. Commands that could be destructive to existing data always warn you so you do not do something unintended.

Special Features

Four features deserve special recognition. *TFM* has a Net Present Value function (NPV) that calculates the difference between two present values judged against a rate of return that you enter. A whole group of expenses can be judged against future cash flows for investment analysis. Column and row referencing is also available. This allows calculations to be made on a column or row one column over or one row up. The references can be absolute or relative. For example, Line 1 [5 column] references the value from line 1 and column 5, and Line 1 [−5 column] references the value from line 1 and 5 columns to the left. Calculating Aging schedules for Accounts Receivable is easy using column and row referencing. It is also possible to reference what *TFM* calls "History" cells. These are columns of information used only for referencing that start to the left of column 1. You can go back as many periods as you need. This is helpful for basing present values on past numbers that you do not want in your current table, such as past sales figures.

The third special feature is an important one for people interested in combining several Income Statement tables into one consolidated Income Statement. The Output command lets you send part or all of a table's data to a disk file for later consolidation. You can even send just 65 pe
cent of the values with the Output co
mand if your company only owns 65 pe
cent of the stock in a subsidiary. Th
weighting functon makes complicate
consolidated income statements muc
easier to develop. The last command is
What/If command that allows you
change any one value in a table and the
recalculate the results. The change do
not permanently change your model, b
is only for doing analysis of different si
uations. If you are interested in seeing th
effect of higher Spring sales figures, yo
would enter WHATIF SALES [SPRING]
4000, and the whole table would be reca
culated using that new value.

Ease of Use and Learning

I found that I had relatively little trou
ble getting up and running on the Con
share program. I had the one problem
mentioned earlier trying to set up m
function keys correctly, but all of my oth
er problems occurred when I did not fo
low instructions in the manual. The ma
ual is very well written with lots of exam
ples. It is set up into several chapters an
some appendices. The first is a tutoria
chapter to guide you quickly through th
capabilities of TFM, interaction with th

MICROPLAN is a financial programmer's dream.

system, reading the screen, and other ge
eral information. The remainder of th
chapters tell you in detail how to use eac
command, with examples included. Th
appendices include a command dictio
nary, a list of the error messages and wh
they mean, how to "install" your termina
and printer to the *TFM* system, and a com
plete index of all terms and command
and where to find them. Most command
can be entered by typing only the firs
three letters of the command. This reall
speeds up what could otherwise be th
slow, tedious task of setting up a table.

One last feature that makes *TFM* eas
to learn and use is the automatic help sy
tem in the software. No matter where yo



e in the spreadsheet program, pressing 0 takes you to the appropriate help enu. If you are in the middle of an edit d you forget what to do, pressing F10 ll give you a list of the different edit mmands and directions on how to get ore detailed instructions on each edit mmand. Responding, for example, th a query on Inserting produces an planation on the screen of how to sert.

npediments

If I could, I would definitely change a w procedures on *TFM*. First, I would low for definition of Decimals, column idths, spacing between columns, and so with ranges of columns (rows). It is a al problem to have to enter in each colnn if you do not want to have all colnns the same. I found that if you edit a ne with a subheading attached to it, the bheading disappears. I understand that you delete the line entirely, the subading should be deleted also, but when u are only making a small change, it is a isance to reenter the subheading each ne. I would also like to have seen the ility to protect certain cells or groups of lls similar to the option in *SuperCalc*. nother option *TFM* presently lacks is e ability to enter centered subheadings ithin the body of a table.

icroPlan

Both the CP/M-86 and MDOS versions *MicroPlan* require a minimum of 96K

YOU CAN easily send ASCII copies of the report to a disk file for later use by a word processor.

AM. Of course, the more memory you ave, the larger your table can be. The anual states that the *MP* programs take p 120K of disk space. You need about 2K more for system files, which leaves 8K if you are using one 160K disk drive.

Figure 4: Screen for the MicroPlan program.

```
                                                MODE=NORMAL ORDER=R/C ROW=1-50 COL=1-20
  ROW 1 <--
ENTER COMMAND
                                                                                    1 FORMAT
ROW                                                                                 2 DATA
---          - --1---- ----2---- ----3---- ----4---- ----5----                      3 MATH
  1                0 0       0 0       0 0       0 0       0 0                    4 FINANCE
  2                0 0       0 0       0 0       0 0       0 0                    5 PRINT
  3                0 0       0 0       0 0       0 0       0 0                    6 STATUS
  4                0 0       0 0       0 0       0 0       0 0                    7 HELP
  5                0 0       0 0       0 0       0 0       0 0                    8
  6                0 0       0 0       0 0       0 0       0 0                    9 STOP
  7                0 0       0 0       0 0       0 0       0 0                    10 UTILITY
  8                0 0       0 0       0 0       0 0       0 0                    11 PROGRAM
  9                0 0       0 0       0 0       0 0       0 0                    12
 10                0 0       0 0       0 0       0 0       0 0                    13
 11                0 0       0 0       0 0       0 0       0 0                    14
 12                0 0       0 0       0 0       0 0       0 0                    15
 13                0 0       0 0       0 0       0 0       0 0                    16
 14                0 0       0 0       0 0       0 0       0 0                    17
 15                0 0       0 0       0 0       0 0       0 0                    18 FORMAT
 16                0 0       0 0       0 0       0 0       0 0                    19   ROWS
 17                0 0       0 0       0 0       0 0       0 0                    20 ROW TITLE
```

This doesn't leave room for a very big table so I recommend that you use two 160K disk drives (or one 320K drive). I used just one 320K drive for my analysis. The program works with a variety of terminals and printers but, to match them up correctly, the manual instructs you to call the manufacturer.

Applications

MicroPlan is a financial programmer's dream. The spreadsheet comes packed with power. It is full of commands to do just about any kind of financial analysis. From cashflow planning to built-in tax schedules with carry-over tax-loss capability, the commands are available for a multitude of applications. Chang Laboratories offers a Tables Module package available that you can buy separately. The module package makes three different kinds of consolidations possible, does variance analysis, and develops complex models. The company also sells Solution Books that include tables for various financial situations, including real estate analysis, budgeting, and sales forecasting. The print options available are comprehensive and can produce a professional-looking report. You can easily send ASCII copies of the report to a disk file for later use by a word processor. The ability of MP to handle so many different financial applications easily lies in the power of its many commands.

Data Handling

Chang Laboratories has taken a unique approach to creating and manipulating a spreadsheet. All commands are entered with a number. The numbers range from 1 to 127, with each number representing either a command or a command group

CHANG *Laboratories has taken a unique approach to creating and manipulating a spreadsheet.*

title (some numbers are not used). There are eight command groups: Format, Data Entry, Math, Finance, Print, Status, Utility, and Program. After entering the command number, *MP* prompts you for any required additional information. For example, to sum a number of rows together, you enter 55. The program then responds with the prompt "BEGIN ROW (1-50):"; after entering 4 as an example, the next prompt is "END ROW (4-50):". *MP* then takes your last row, calculates the sum of the chosen rows, and puts the answer in the present row.

When *MP* first comes up on the screen, the top row is the status line (see Figure 4). The mode information, row/column calculation order, and the number of selected rows and columns in the table are shown on the status line. This line will occasionally show any error or system message in reverse video. The next

line displays the current location of the cursor. The third line is the command line where you enter the command number and any additional information. The rest of screen is divided into the table itself and a menu window. The menu window constantly displays the commands and their corresponding command number. The table display area show 17 rows at a time. You can change the rows and columns shown by using either commands or Escape/arrow sequences to move up, down, left, and right. The GOTO command will take you to an exact cell. The current cell is indicated by an inverse-video block that is called the cursor.

MP works in two modes, Normal and Program. When in Normal mode, the table works like any other spreadsheet: all the commands are stored in the table. The table is generated as the commands are entered. In Program mode, all commands are stored in a special place in memory capable of saving 100 steps. These steps

THE PROGRAM mode is extremely helpful when you want to work with a certain table again and again.

are simply a sequence of commands that can create, load, modify, and/or print tables. The Program mode is extremely helpful when you want to work with a certain table again and again. A program can be created that can load a previously saved Income Statement table, prompt the user for new data, modity the table, then print and save the modified Income Statement.

Very large tables can be created and stored, depending on the size of the available RAM and disk storage. With the SETUP command, the program asks you to enter the number of columns you desire from 1 to 99; it then calculates the maximum number of rows possible by taking into account the amount of RAM left. Figure 5 shows some examples of the sizes available if you have 256K of RAM.

Unfortunately, this command does not work quite right. If you pick the maximum number of rows or anywhere near it after choosing the number of columns, the system dies completely or dies while giving you an error message, and you have to reboot your PC. If, for example, you choose 99 columns and then pick 30 rows, everything will be okay. On the other hand, if you choose 99 columns and 40 rows, the system crashes.

Commands

The first of the eight command groups is the Format group. These commands let you set up row titles of up to 40 characters and column titles of two lines having up to 20 characters each. The Set Type commands select the type (blank line, data, subheading), kind of underlining if any, number of decimal places (up to 3), and other special formatting for each row or column. You can exchange rows or columns with the Reorder command. The last two Format commands, Show Rows and Show Cols, list the current format specifications for each row or column.

The next group consists of the Data commands. The main command is Enter, which allows you to enter values into the table quickly. The values can be constant or grow from a base value by increments or by a percentage rate. You can also enter values one at a time like sales figures for past periods. Changing a table value is easy using Change. Use the Select Col, Select Row, and GoTo commands to move the cursor position and screen display. The Fix command will calculate the results for just one row or column. MP provides two commands for mathematical equations to calculate the data of a row or column. Formula and Plug prompt you to enter a formula that can reference entire rows or columns or a particular cell. The formula can use all the regular

Figure 5: Example of the sizes of rows and columns available to a MicroPlan user with 256K RAM.

```
Enter # of Columns (1-99): 1
Enter # of Columns (1-99): 5
Enter # of Columns (1-99): 13
Enter # of Columns (1-99): 99
Enter # of Rows (1-726): 10
Enter # of Rows (1-512): 10
Enter # of Rows (1-321): 10
Enter # of Rows (1- 58): 10
```

math functions such as *, /, +, and −.

The Math and Finance comman groups are probably the most powerful

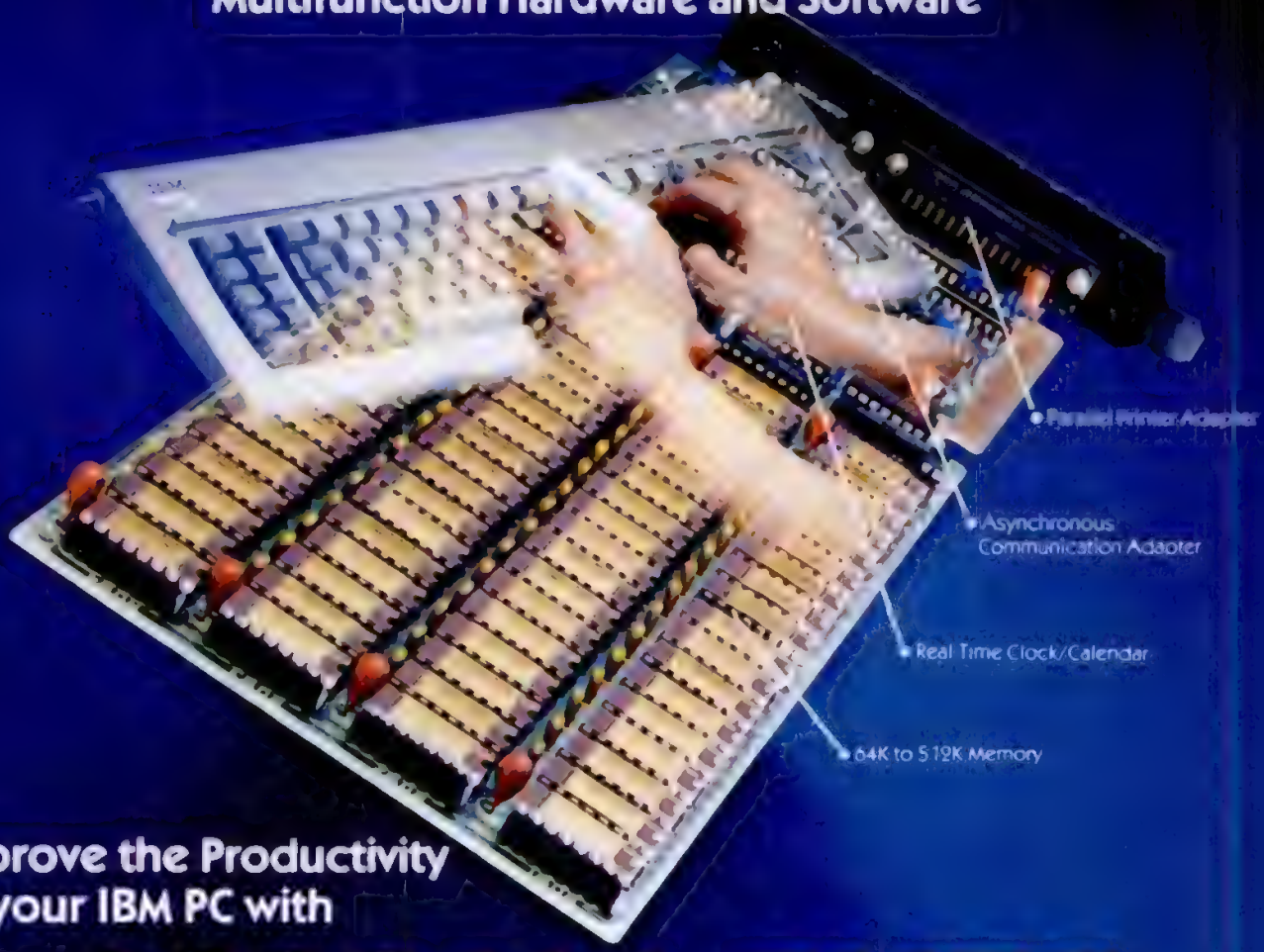
VERY LARGE tables can be created and stored, depending o the size of the available RAM and disk storage

any spreadsheet and financial modelin program available. Below is a list of th commands available from these tw groups.

MATH:	FINANCE:
ADD	SET DEPR
SUBTRACT	DEPRECIATE
MULTIPLY	SET LOAN
DIVIDE	LOAN
NEGATE	DCF
INVERSE	IRR
INTEGER	RATIO
ROUND	% OF TOT
CUMULATE	PCT
ABSOLUTE	K PCT
ADD K	LAG
SUB K	LEAD
MULT K	GROW
DIV K	SAVINGS
SUM	SET SCHED
GET	DO TAX
FLOOR	
CEILING	

Most of the commands are obvious to what they do but some need addition explanation. The Math commands with K after them allow you to use a constant work on a row or column. Get takes value from other rows and columns and pu them in the present row or column. Flo and Ceiling take an existing row/colum and replace any value lower or high respectively than a prompted minimun maximum with that miminum/max mum. For example, by initiating the Flo command, the following questions woul be displayed: "What row/column shou be worked on?" and "What is the min mum value?" Once the questions a

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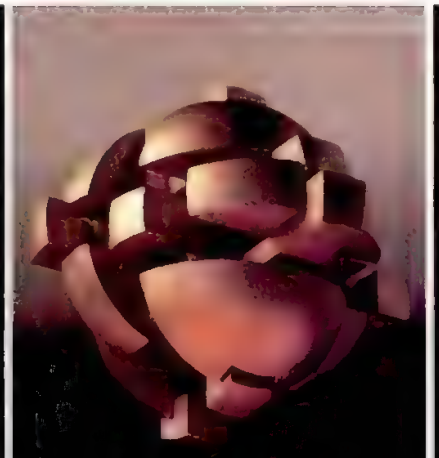
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nswered, any values lower than that inimum would be replaced with the ew minimum.

The Set Depr and Depreciate commands set up depreciation amounts using ny of four depreciation schedules: sum f the digits, straight line, double declining balance, and double declining balnce with automatic switch over. Inputs

WITH SOME clever manipulations of the commands, you can carry income losses forward against future income profits.

r book value, life, and salvage value are l prompted for and put into some nused row. *MP* uses pre-set formulas to gure amortizations for fixed payment ortgages and equal principal payment ans with the Set Loan and Loan commands. The program prompts for loan pe, terminal balloon payment amount, rm of loan, and annual interest rate.

The DCF command allows you discount cash flows for different investents and projects by asking you for the scount rate and the cash amount's row. ou can even determine the internal rate return with Irr. Entering different owth rates for different periods is easy sing the Grow command. Using the Lead d Lag commands lets you shift data om different periods, thus facilitating shflow projections and aging of Accunts/Receivable. One last command at I personally was pleased to see cluded is Do Tax. All you have to do is t up the tax brackets using the Set Sched mmand. You enter the number of ackets, the upper limit and tax rate for ch bracket, and the tax rate for income ove the last bracket. With some clever anipulations of the commands, you can rry income losses forward against ture income profits, thereby reducing ture tax burdens.

There is one command group that will robably be used frequently once you ecome familiar with all the commands. Program commands let you store up to 100 commands in a special area in memory. These program commands, or steps, can be stored on disk for late retrieval. There are many advantages to being able to create, store, and run programs. You can create a skeleton income statement program that can be used as many times as you need. Let's say, for example, that you are the controller for your company. You know what your material costs and administrative costs are as a percentage of sales. You also know the tax brackets and rates. You can create a program that prompts the user for the sales figure and any fixed costs, the before taxes income and after taxes income, and generate a printed report. Now each time you want an Income Statement, you load the stored income program, enter the data, and out comes the report. The different program commands let you load, save, print, clear, show, list, and erase programs.

The Status command group contains a variety of commands to select the operating mode of *MP*. Program shifts the spreadsheet into the program "learning" mode where every subsequent command entered will be stored in the program memory. If a program already is in memory, the system asks you which step you want the next command to follow. This allows inserting steps in existing programs. The Delete command erases one or more steps from the program. When you are finished entering the program steps, enter Normal and the system returns to the spreadsheet mode. The Run Pgm command runs a program that you have created or loaded from disk. *MP* has some commands that restrict later commands from working on any rows/columns except the ones that you specify. For example, if you have 20 columns of data but you only want to sum the rows in the first 10 columns, you enter Col Range and choose columns 1 thru 10 as the "active" columns. Now when Sum is selected, it will only sum columns 1 thru 10 and leave 11 thru 20 alone. The last command in this group, ORDER, selects the computing order, which can be row only, column only, row first then column, and column first then row.

The next group gives you commands to work with completed tables. The Utility commands let the spreadsheet user save, list, print, and erase tables. Load All and Save All load and save both a program and the table created by the program. If you have a PC with two disk drives, entering Set Drive selects the drive where all programs and tables will be stored and retrieved. Clr Data erases the data on the table but leaves the program steps alone; Reset erases both. Set Up, which I mentioned earlier, is included in the Utility commands.

There are two instructions not included in any command group. The Help command prompts you for the command number for which you need help. The system then displays three lines of information on what the command is and how to use it. The other instruction is vital to those of us who do not like to reboot to get out of a program: Stop. The only command group we haven't covered is important for creating professional printed reports.

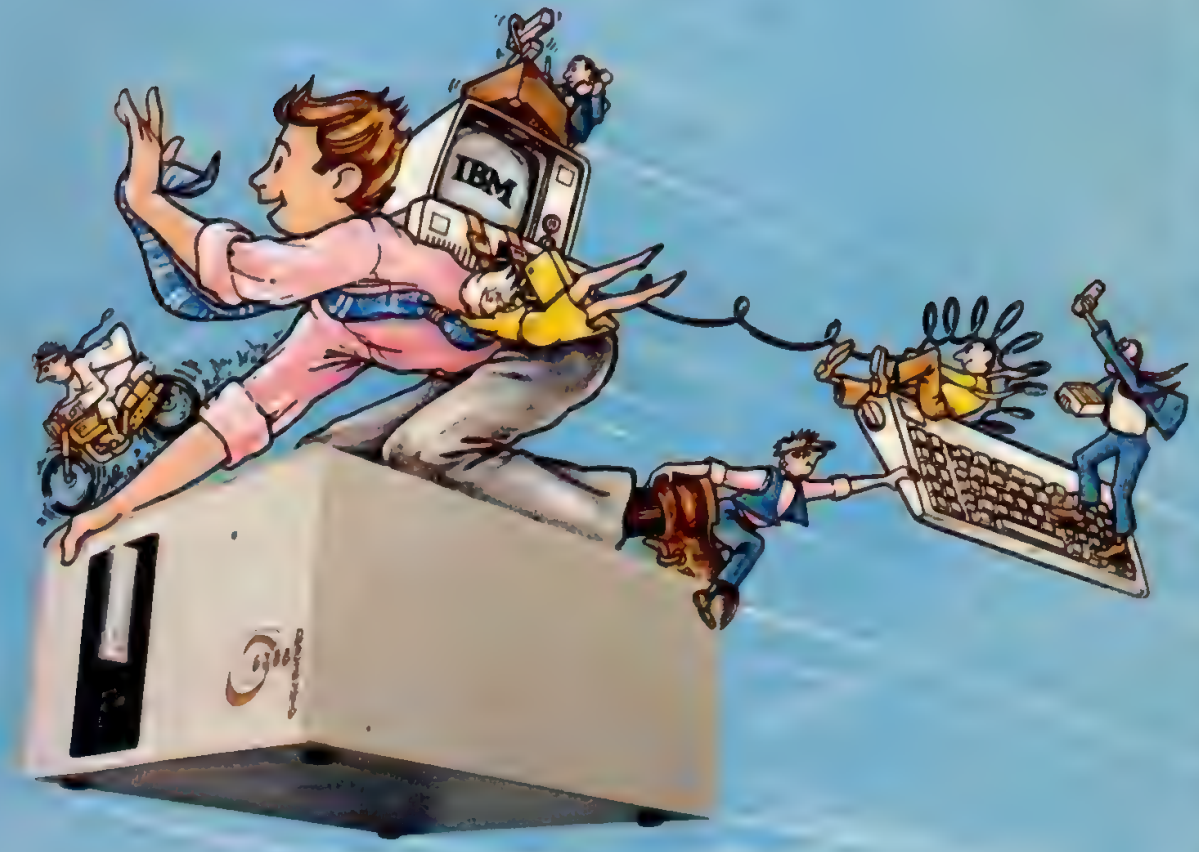
Report Generation

The Print command group selects the various options that affect your printed report. Most of the options affect only the printed report and not the screen. Some of the print options have to be selected using the Set Type command discussed earlier. Options is a catch-all command that sets up global default conditions and special print options. Using this command, you can set the row description width (4-30); column widths (4-20); number of columns per printed page (1-20); number of decimal places (0-3); whether or not to automatically omit zero rows; how to print zero values (0, blank, dashes); which column to print row descriptions after (0-9); how to show negative numbers (−N,N−,(N)); continuous print or pause between pages; whether or not to print commas; double or single spaced; and whether or not to omit row and column numbers on the printout.

AFTER YOU have entered all the information, the report prints automatically.

With the Titles command, you can

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Automatic Footnotes	Yes	No
User-Defined Commands	Yes	No
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Supports Multiple Printers	Yes	No
Crash Recovery	Yes	No
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Suggested Retail Price	**$300**	**$495**

The FinalWord for the IBM personal computer requires 64K, IBM DOS, and a printer or communications adapter; otherwise, The FinalWord requires a 56K CP/M system and any video terminal with cursor positioning character sequences. It is presently available in 8" standard format for the TRS-80 Model II, Vector Graphics and Altos Systems. There are compatible versions for the HP-125, Xerox 820, Cromemco, Micropolis and Dynabyte Systems, and there are 5¼" versions for the Heath/Zenith Z-89, Northstar, Apple and Superbrain. **Coming Soon: The FinalWord for the DEC Personal Computer.**

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choose to have a page number in the upper right corner of the report and/or print the current date in the upper left corner, the range of rows to print, the range of columns to print, and up to three lines of title information that is automatically centered at the top of each report. After you have entered all the information, the report prints automatically. If you want just a rough copy of the report, you can use the Report command to get a printout without having to answer all the prompts. With Set Type, Options, and Titles, you can set up your report to look just about any way you like. Anytime you want to see what options have been selected, enter the Show Opts command and the formatting information will appear on the screen. The last command in this group, Save Rep, sends a copy of the formatted report to a disk file for use with a word processor.

File Management

Each file name consists of eight characters with a three-letter tag that identifies whether the file is a table or a program. Standard MDOS naming conventions hold true when naming the files. When loading, erasing, or saving a table

MP STILL has more power in its commands than any other spreadsheet I have seen.

or program, MP lists the existing files on disk one at a time. To get the entire directory of tables or programs, you have to use the LIST PGMS or LIST TBLS command, which sends the list to the printer only.

Special Features. Except for one, all the features that I consider special are in the Financial command group. Having built-in commands to work with different loan situations, depreciation schedules, and tax bracket calculations is exceptional. I also see the Formula command as a very useful feature that can be used where there does not seem to be an existing command to handle the problem. When the Set Up command is corrected by Chang, that also will become a "special feature" on my list. I like the fact that the computer automatically calculates the largest size table that the memory will hold.

Ease of Use and Learning

I found starting the program and entering a table immediately was easy with *MP*. The basic commands are simple to learn and, with the command menu always displayed at the right, you can always remember which command is which. However, the programming commands are a little harder to learn.

The manual is not organized very well. The first chapter guides you through an easy example to get you oriented. However, the following chapters present the command information in a confusing manner. There doesn't seem to be any order in which they introduce the commands. Some of the commands do not even have examples with them. One command is listed in the index but doesn't show up in the manual (the Savings command). With a good manual that explains each of the commands and their options and gives examples, MP would be a breeze for a novice to use, since all required input is prompted for once you start. With so many first-time computer users around, a well-organized manual with numerous examples is a must!

Impediments

There were no major impediments I could find with *MP*. However, there were several little annoyances. The manual was not up to par. Some commands had no examples, one command was omitted entirely, and a couple of the commands did not even work the way the manual described. I was working with a program that had nine steps, and I kept trying to insert an Enter command in the middle, which I had done earlier in the same program. But in this case I could not get it to work no matter how many times I tried. I had to erase and re-enter the whole program to finally make it work. Also, I had trouble setting up the Cancel key. The command was supposed to be initiated with the "Del" key, but it never worked. I finally printed out the help file and noticed that I could use "Control A" as a Cancel also. This problem could have been avoided with an appendix in the manual that explains exactly how to install the keys with the software. Another thing that bothered me is that every now and then certain commands erase the top status line and the program will not restore it after the command is done. Finally, I think the program could use some work on its display routines to make

TFM REMINDS me of the experienced, crafty boxer who has many different moves in his repertoire.

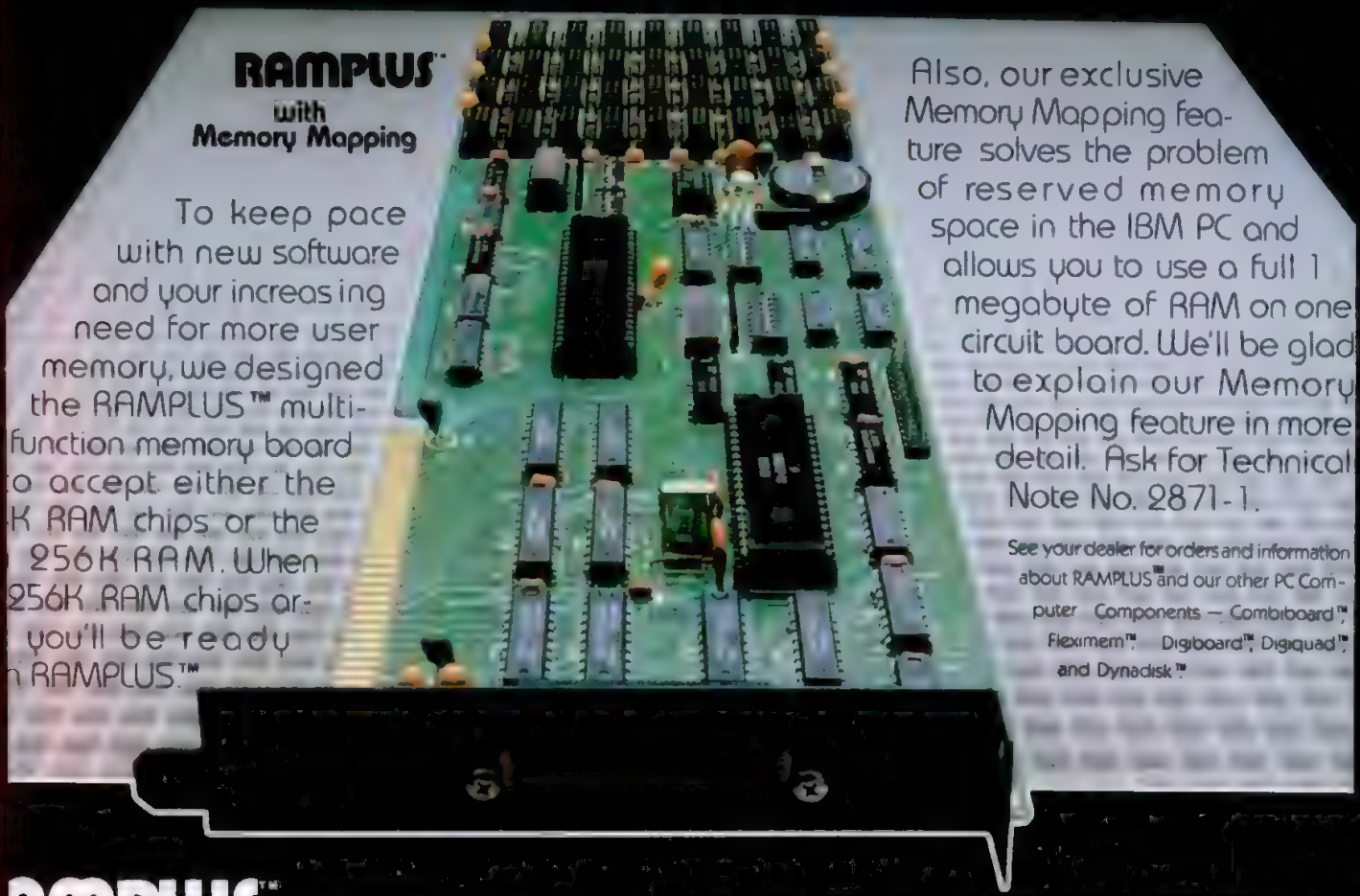
entries appear neater on the screen. For instance, when you display program steps on the screen, they are placed in the middle of the table with the rest of the table still displayed all around the program listing. This is distracting. The display should be blanked before the program is listed. When the program steps no longer need to be displayed, the screen should be blanked again and the table then restored complete with a new status line.

None of these small problems are really serious; you can work around all of them. I suspect that most of the problems are a result of transferring the system from CP/M (which it was first written for) to MDOS. The version I have is 3.1, and I was told that version 4.0 will soon be introduced. Hopefully most of these problems will be corrected. Despite its problems, *MP* still has more power in its commands than any other spreadsheet I have seen.

Comparison Summary

In trying to describe both these spreadsheets, I could not help thinking of two boxers. *TFM* reminds me of the experienced, crafty boxer who has many different moves in his repertoire. His movements are smooth and easy. *MP* has the personality of the stocky, muscular boxer: *MP* just keeps coming at you with all of its commands. Both spreadsheets are capable opponents. As with many software packages, the choice that the buyer makes may come down to his personal style. */PC*

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CIRCLE 586 ON READER SERVICE CARD

TypeFaces is designed to enhance the features of a dot matrix printer. It prints larger-than-normal characters in a variety of type faces on many Epson (IBM) or Integral Data Systems printers. The output can be used for letterheads or signs, or can be photo-reduced to achieve a near letter-quality effect.

TYPEFACES often allows you to substitute a dot matrix printer for letter-quality printer.

Features

TypeFaces works with an Epson MX-80 or MX-100 with Graftrax, or an IDS 460/560 or prism printer. By using dot addressable graphics, it will print text in up to 15 different styles, including Roman, Italic, Script, Greek, English Gothic, and graphics fonts, (see Figures 1 and 2). The Roman, Italic and Greek fonts come in two sizes, and a variety of types (called simplex and complex).

TypeFaces reads special dot commands on lines beginning with periods. It provides many of the features used by text formatters, and can begin new pages; center lines; set up headers and footers; justify, fill, and start paragraphs. Also included are handy commands to set the interline spacing in small increments and to set the distance between an underline bar and the characters on the line.

Text is proportionally spaced automatically. This means that a skinny letter like i uses less room than a fat letter like m, resulting in a visually-pleasing page. When coupled with a standard text editor, and photo-reduction, *TypeFaces* often allows you to substitute a dot matrix printer for a letter-quality printer, and achieve features unobtainable on most letter-quality printers. The result, while not quite letter quality, is good enough for business correspondence and all but the most demanding printing jobs.

While the program is running, the screen displays the text file being printe This makes it easy to follow along to sp mistakes in the text file.

THE ONE desirable feature missing is the ability t mix type faces.

Perhaps the one desirable featu missing is the ability to mix type face Each printed line can contain only o type face. The program also ignores t eighth data bit, so none of the IBM li drawing and foreign language characte can be printed.

The Cassette Tape

All of the products distributed Alpha Software Corporation, includi *TypeFaces*, come with an introducto audio cassette. You are expected to p the cassette into a tape deck and listen the spoken instructions while trying c the demonstration. The cassette does n contain any more information than t two-page introduction, but it is wor

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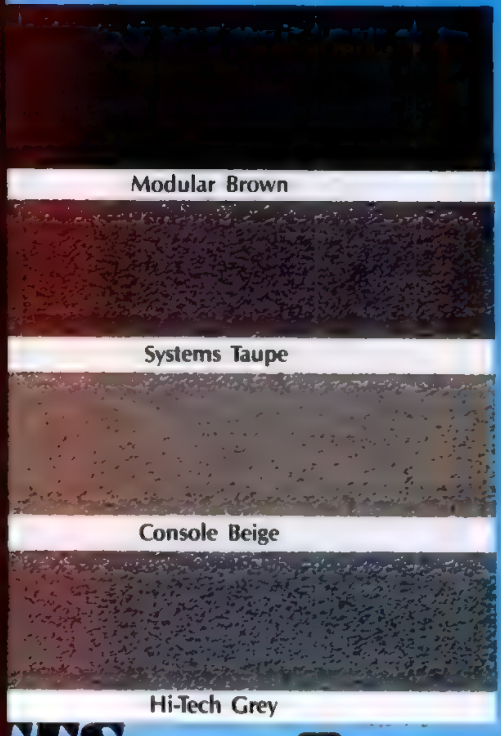
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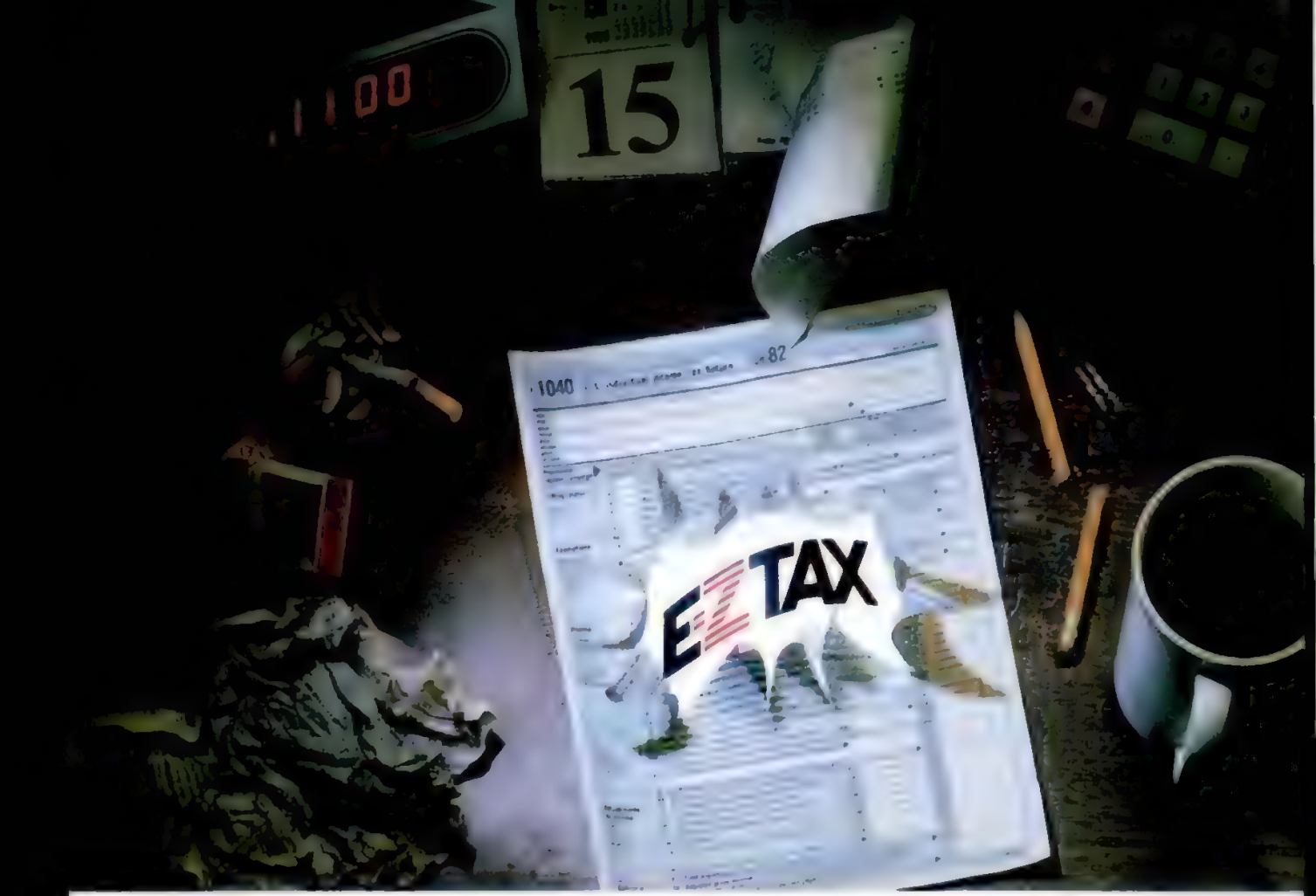
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CIRCLE 240 ON READER SERVICE CARD

g. It's like having a knowledgeable standing over your shoulder helping learn.

formance

TypeFaces consists of two single-sid-lisks: a program disk and a data disk. program disk is copy-protected and *eFaces* comes with a copy program tten in BASIC that lets you make up to backup copies. The backup process, vever, is slow, requiring repeated rtion of the original and the target .

IF THE printer runs out of paper, or is off-line, the program seems to wait forever.

The program itself runs slowly. If the nter runs out of paper, or is off-line, the gram seems to wait forever until the blem is corrected.

Still, *TypeFaces* works smoothly and ably on both an Epson with Graftrax an IDS printer. The only bug found s that text shorter than a full line was printed at all.

se of Use

TypeFaces is entirely menu-driven. e questions are very explicit, and even vices should experience no confusion. ere were not many menus, so experi-ed users will be able to speed through eration.

Perhaps the worst thing about Type es is the copy protection. This means t the program and the data disk are ays two distinct disks, which can be a uine nuisance. If you edit text on a arate disk, then the data disk has to be led out and the text disk inserted in middle of the program.

TypeFaces was extraordinarily simple un. Initially, however, some of the dot nmands are a bit confusing. Figuring some of the finer points requires trial l error. You'll probably have to spend hour or so to familiarize yourself with formatting portion of the program.

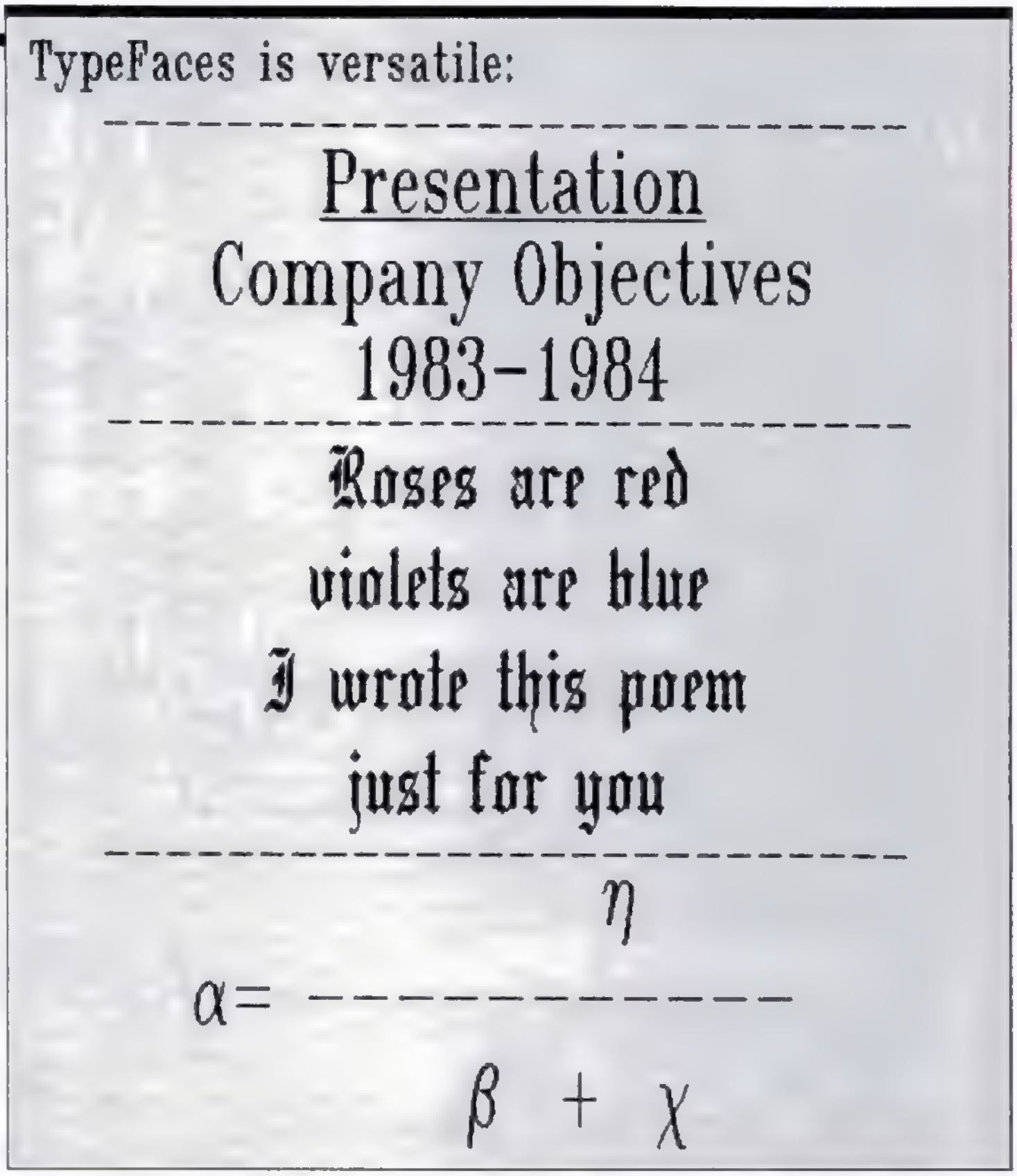


Figure 1: Sample TypeFaces *output shown actual size. Different typefaces may be combined and printed out together.*

Documentation

The user manual is divided into sections labeled "Before You Begin," "Introduction," "Getting Started," "Super Easy," "Easy," and "Still Easy." Much of the real information, such as which dot commands do what, is relegated to a hefty appendix. The manual steps through every phase of *TypeFaces*, including how to copy files, erase files, use Edlin, and run Chkdsk.

For a first-time user this level of detail is helpful and welcome; for more advanced users it may be somewhat boring. It was also difficult to search the lengthy tutorial to find out how to load the disks and run the programs.

Further, because much of the information is in appendices, it is extremely difficult to find information once you pass the novice stage. The type samples, for example, are located in the middle of the manual. Finding the dot command summary required leafing through the full manual.

TYPEFACES fills a previously-unoccupied niche with a smooth, useful program.

There is a useful table of contents, and a not-so-useful index. For example, the line height command (.lz), is indexed under "adjust line height."

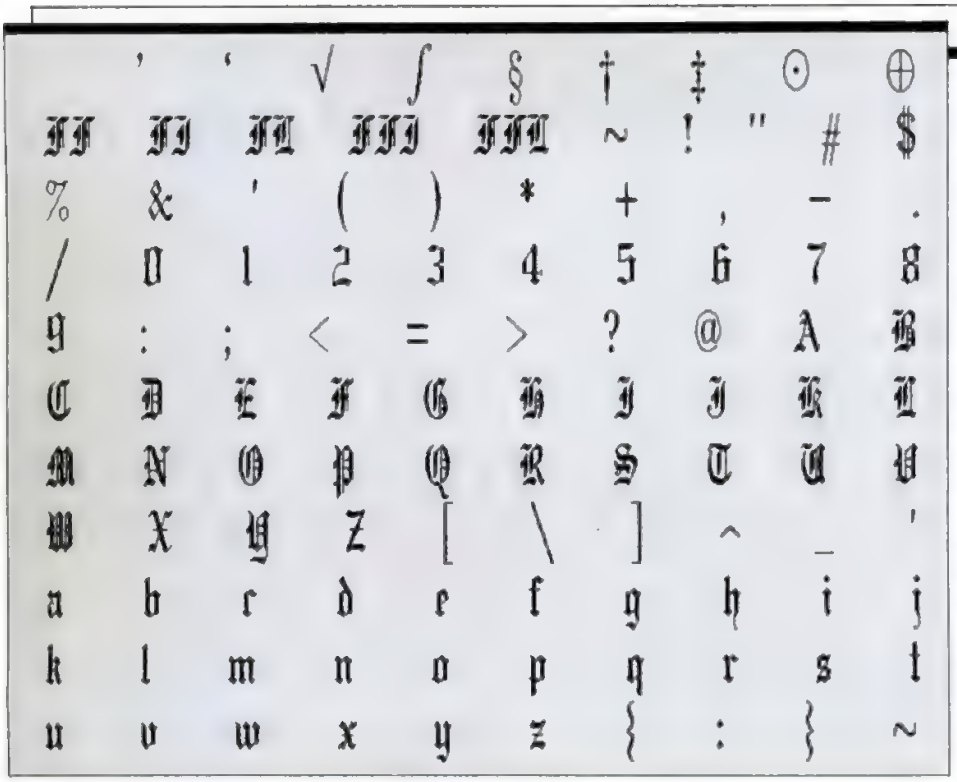


Figure 2: English Gothic character set (reduced from original size).

Error Handling

Errors caused by entering the wr
answer to menus are handled well. N
of these mistakes can cause any d
age.

The program ignores invalid dot c
mands or incorrect font selection.

TypeFaces fills a previously-unoc
pied niche with a smooth, useful
gram. It runs a bit slowly, and the dc
mentation is lacking, but neither of th
shortcomings is particularly trou
some.

An advanced version of TypeFaces is in early May. It will offer 50 diffe fonts (compared to 15 currently) will allow users to print out character any size up to 5 inches tall. In addit the characters will appear onscreer capability lacking in the version viewed, and will print out sideways d the page rather than across, if desi Owners of previous editions of the p age will be able to update their progr for a nominal handling charge.

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- △ Experimenting with words and sentences

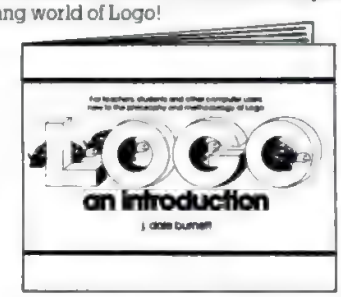
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7. Transaction Register
8. Open Voucher Report
9. Aged Payables Report
10. Detailed Vendor Activity Report
11. Summary Vendor Account Report

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2. State Tax Tables
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APPLICATIONS/HAL GLATZER

The PC breaks into show business with Ibis, a program that helps talent agents bring Baryshnikov to Toledo or a Celtic band to New York.

The Automated Agent Helps Performers Get Gigs

What's your picture of a talent agent? Is it a sweaty man chomping a cigar while he sweet-talks a deal on the telephone? Is it a small-town arts administrator, searching through index cards, trying to promote her favorite folksinger into a big-city music festival? Or is it the manager of a band, trying to remember who it was that came backstage last night offering them another job?

The common thread in talent management is information-processing: knowing who's playing where, when, and for how much. Personal attention and endless hours on the phone give successful managers an edge, because they can parlay that information into signed contracts. Since so much of the business depends on managing knowledge, not just performers, automation via computers was inevitable. Now, one agent has teamed up with a programmer to create a vertical software package for the PC that is an "integrated booking information system"—*Ibis*. It was designed for music talent agencies, but is also suitable for fashion model agencies and speakers' bureaus.

John Ullman runs the nationwide Traditional Arts Services from Portland, Oregon. He finds audiences for folk musicians such as Bill Monroe (the "father" of bluegrass), Mike Seeger, Elizabeth "Libba" Cotten (who wrote "Freight Train") and a variety of black, Irish, Cajun and Celtic performers. He said that an agent's biggest problem is knowing who to call, or write to line up gigs, or performances.

VERTICAL software packages are specific to one industry or business.

"Here's a typical problem," he explained. "Let's say someone calls me and wants Libba Cotten in Carlsbad, New Mexico, in July. That's just one gig, and it pays well, but it's months in advance; we don't want to pass it up, but we couldn't just send her there from her home in Syracuse, New York, without some connecting dates along the way. My problem is put together a tour—to find every pote tial sponsor who could put her on in t Southwest in July.

"Now, before we got the computer would scratch my head and say, 'Whe are the sponsors around Carlsbad?' or through my Rolodex file looking names and start making phone calls. E what happens? I call somebody and th say, 'No, I can't use her, but how abo so-and-so?' and right away I have to ta some time away from what I was doing put together a contract for another p former and another gig."

The software Ullman helped to wr is a database management program th lets him find those potential sponso with just one pass through the data. keying in the categories he wants, Ullm makes the PC sort out those sponso whose zip code or area code is in t Southwestern states. It will look for tho among them who have expressed intere in folk artists like Ms. Cotten, and it m also include anyone whose season cove the month of July, and who can be expe ed to meet her fee. What Ullman gets i printout of mailing labels that he can sti on a promotional flyer for Ms. Cotten.



knows, when he sends those flyers out, that the sponsors will be predisposed to considering her.

"In the time it would take to make just a few phone calls," said Ullman, "I can send out a hundred direct-mail pieces, and be certain that I am reaching the right people. I can use my time for other things, and my phone bill will be smaller. Then, when Libba Cotten makes her tour, it will be so efficiently scheduled that her travel expenses will be lower, meaning more money for her."

Enter the Programmer

Since Ullman knew the music business, but not the ins and outs of programming, he turned for help to an old friend, Robert Harper, of Seattle, Washington. As Harper Business Systems, he wrote database software for mainframes, minis and micros. "The IBM PC is a winner," said Harper, "and that's why we went with it. If you count up the microcomputer manufacturers who are going to be around in 5 years, you'll drop all but about five—and IBM is at the top of the list of survivors. Since very few arts managers or talent agents have gone out and bought other computers so far, they might as well buy a PC when they're ready to automate, and we have the software to let them do it."

Ibis, as they developed it, became a modular software package, with one part dedicated to sponsor information and mailing list management, and a second part for contract-writing and artist information.

Each page of sponsor data holds up to 28 categories (what data base management system programmers call "fields"), including not only the sponsor's name, address, and phone number, but the size of the performance hall, availability of housing nearby, the kinds of music the sponsor sponsors, and room for the agent's remarks. A sample sponsor record is reproduced in Figure 1. There is also a menu-driven process for creating new categories.

Users select fields, and change their "values," by entering new data on a line at the bottom of each page. Harper simplified the process, for novices. "I decided not to use the cursor-movement keys," he said, "but rather to have the user type the first two letters of each desired field—for example, AD for address and 1R for first Remark line. While that may not the most efficient way to enter leng fields, like remarks, it's perfect for short fields, like phone numbers, and any case, it's consistent throughout program. Remember, these people are ent agents, or performers setting up th own gigs—not computer professional

The contract and artist informat module uses the same menu-driven p cedure. Harper said, "The agent can ate or update a performer's schedule, ate or make changes in a contract, keep track of important arrangeme such as who to call on arrival."

Horizontal and Vertical Software Packages

Something for everybody or everything for somebody?

The expressions "horizontal" and "vertical" may be most familiar from the dials on TV sets, but they also refer to software packages. Spreadsheet simulation, general ledger, accounts payable or receivable, and word processing programs are horizontal: they serve the same need in every business, across the board.

Vertical software packages, however, are specific to one industry or business, and handle a whole range of tasks that the particular business performs. In the restaurant trade, for example, the software that links electronic cash registers to a central computer will record sales and update the inventory every day; it could also handle employee payrolls, and even mix drinks at the bar!

Vertical packages are more likely to demonstrated at trade shows for industry they have targeted, such as fo service, than at "computer" or "off automation" shows.

Horizontal software can be sold t variety of customers, spreading the cos development over a wider base of e users, which reduces the package's pr per unit. Vertical software must be craf with a single business—or a generic c gory including that business—in mind probably will be expensive to buy, co pared with a horizontal product, because it does not have to be custo tailored for each client, it may cost les the long run. —H

Figure 1: A screen produced by Ibis that displays information on Concerthall Productions, a hypothetical sponsor of a concert serie at Madison Square Garden.

```
                ENTER NEW SPONSOR DATA      DELETE N                    FILEDATE 12-13-82
SPONSOR#   160                                  SEASON
   INDEX CONCERTHALL PRODUCTIONS            BEGINS  1                  MAILINGS 000
 ORGNAME Concerthall Productions            ENDS 12                    LIST ACUCAA
DIVISION Classical Artists Series             HALL Madison Sq.        SPECIAL INTERESTS
 ADDRESS 5500 Broadway Ave.                 SEATS 20000                1INT ALL
    CITY New York                           HIGH$ 150000               2INT
   STATE NY ZIP 10101                     HOUSING N                   CONTRACT RECAP
    ATTN Mr. Connoisseur                     AREA 201                NUMBER 000
 1REMARK Mr. C. likes only                    TEL 999-9999 X9999      TOTVAL 0000000
 2REMARK World-Class artists. 3REMARK                                   LAST
                                                                        PERF 00-00-00
FIELD?                                  (JUST HIT RETURN IF NO FIELDS ARE TO BE UPDATED
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The Value of Teamwork

Harper and Ullman teamed up cause each had a skill to share. "Ours partnership between a person who working part of the real market and a son who understands how to prog what that market needs," said Ullm "It's a paradigm for how small-busi software should be designed."

THE SOFTWARE finds potential sponso with just one pass through the data.

The system they unveiled to 125 a cies at the Western Alliance of Administrators, in Seattle last Septem costs about $8,000. Included in the p age were a PC with two disk drives a printer for about $5,000; and the *Ibis* ware at a price of $3,000. Ullman "*Ibis* can help generate $10-15,000 a y in income or savings, from an investm of under $10,000, and should pay itself in a year."

Currently, the only shortcoming of is the limited storage on IBM's disks. man indexes sponsors alphabetic and needs about 12 disks—one for e two initial letters. To make a geograph search, such as the Carlsbad example has to insert every disk by hand. Still, much faster than any manual search ever been. When the price of hard d comes down a bit, he expects to upg his system, and he anticipates that ot will also put their files on Winchest

To people in the business, he "The things *Ibis* does are the *core* of w an arts agency does. It reduces paperw and cuts way down on office overhea enforces sound business practices, wh are not always done, because they req a large staff to do them by hand. An makes possible a lot of extras that, u now, could only be done by larger a cies, such as making multiple copie itineraries, so everybody who needs can get one.

"A neat trick is, when you're prin copies of the itinerary, you can put i

ave out certain information. The per-
rmers need everything, all on one
ge," says Ullman, "but the sponsor
ould not see what fees other sponsors
that tour are paying; the local publicity
rson needs only the days and dates for
at particular city."

The marketplace for *Ibis* is limited to
ly those agencies who purchase IBM
Cs, but Ullman has found that few agen-

ULLMAN HAS found that few agencies, except the very largest, have already bought any microcomputer at all.

es, except the very largest, have already
ught any microcomputer at all. Those
at have, he says, have paid many thou-
nds of dollars for custom programs, or
r adapting DBMS and accounting pack-
es to their needs. The majority of small-
agencies, or bands who book them-
lves, told him that they had considered
ying a micro. Now that a vertically-
tegrated package is available, Ullman
lieves that those who are ready to auto-
ate will do so.

"It's basically a virgin market," he
id. "Agencies and artists—either as
dividuals or in cooperatives—can
ake use of them right away. Only a few
the people I talked to are 'technopho-
c.' Maybe about ten percent will not put
computer in their office. The rest say
ey're interested. A PC with *Ibis* will cost
out as much as a modest-priced car, but
e agency gains it back in savings by not
ring part-timers to type mailing labels
contracts. That cost me $4,000–5,000
st year alone. The artists gain, too,
cause the agent gets more time to give
em more personal attention.

"Speed is crucial. When I finish talk-
g with a sponsor and I ask, 'Is that date
m?' and he says 'Yes,' then as soon as I
t off the phone, I want to hit the PRINT
tton and get the contract in the mail
ght away. There's no agent in the world
no doesn't recognize *that* need!" */PC*

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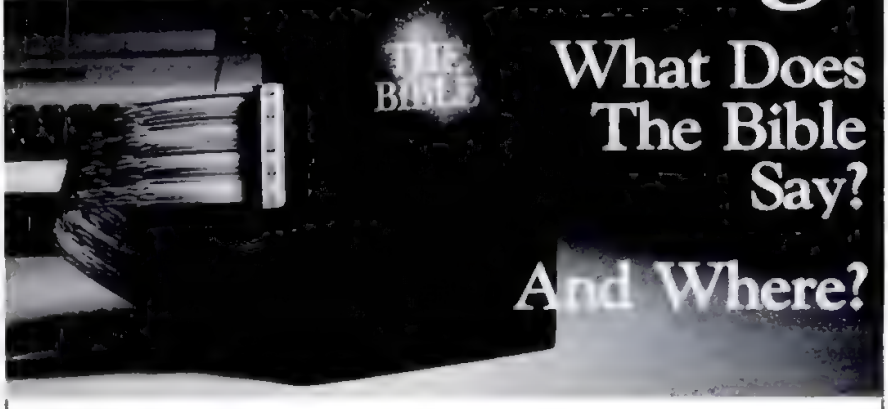
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PCs can now be used to create Ethernet networks. The installation of one of the earliest is described first-hand by a pioneering consultant.

Let There Be Ethernet!

Recently I had the good fortune to install one of the first IBM PC Ethernet networks, for the Independent Bankers Association of Georgia. Microcomputer networking is becoming common, but the number of network systems now available is almost equal to the number of large companies that have considered using networks. The confusion resulting from this lack of standards has crippled everyone's efforts considerably.

One of the first available computer networks was Arcnet, which uses radio communications to connect large computers throughout the country. The most common network is, of course, AT&T's telephone system, which is accessible by modem.

Networking is a method of interconnecting multiple computers or terminals. This may be done by physically tying together every terminal/computer, or by connecting terminals to a central switching computer. Some of the more complex networks can connect one terminal to another in a variety of ways. The route for connections is determined on the basis of availability, as much selects the telephone company long distance routes. When you call long distance, the actual route depends on which lines are already in use. A call from New York City to Boston might go via Los Angeles.

Networks are currently available from IBM, Digital Equipment Corporation (DEC), Wang, and Corvus. There are major differences in the kinds of networks available. The most important of these is bandwidth, which translates as the amount of information transmitted per second. A large bandwidth network, such as Wang, can transmit video signals, which are necessary for the interchange of complex real-time graphics. A medium bandwidth network, such as Ethernet, is adequate for transmitting files and programs, and non-real-time graphics. A low bandwidth network, such as RS-232, is better suited to the transmission of character data to terminals from a main computer system.

A criterion that is often as important is the physical medium used for interconnections. Some networks require coaxial cable (as in cable TV), while others require multiple wires, or glass fiber optical cable. Ethernet is convenient because it operates over coaxial cable, which is commonly available and inexpensive.

Ethernet was one of the first well-defined systems and is one of the best networks available. Much of the original design work can be credited to the Xerox Corporation, which had the foresight to realize that a low-cost network would become exceedingly important. Xerox currently operates a number of internal networks, and Ethernet installations can be found in other companies around the United States and Europe.

ETHERNET is convenient because it requires only coaxial cable.

Planning a Network

The Independent Bankers Association of Georgia (IBAG) required a system that would let each of its four employees access to the same data. The associa works with one large database made u information about its member ba Each employee needs to review about the members. One employee m be using the data to address letters, w a second looks up phone numbers, a third updates the membership ro



ILLUSTRATION: BOB CONRAD

.G could have used either a multiuser nputer with a number of attached ter- nals, or several microcomputers acting nodes of a network, with a common d disk for the data base.

n terms of cost, the two solutions were ghly comparable. A multiuser operat- system allows more than one person se a data base at a time; the standard PC operating system, MS-DOS version 1.1., does not. The advantage of using multiple microcomputers is that expansion is simply a matter of adding another micro. Also, microcomputer software tends to be friendlier than minicomputer software. In addition, a successful network would probably make it much simpler for member banks, some of which

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have far more employees than the association, to set up networks using the same hardware. Standardization would greatly reduce the manpower and training required for the members.

Once IBAG made the decision to use small microcomputers rather than a larger micro or mini-computer, it had to select a specific microcomputer and a network. The IBM PC was a natural choice for the individual nodes. It is probably the most inexpensive second generation microcomputer, and the support is outstanding, both from IBM and third-party vendors. The availability of such desirable software as *VisiCalc* and Dbase II clinched it.

A MEDIUM bandwidth network, such as Ethernet, is quite adequate for transmitting files and programs.

Choosing a network was also easy. Although other companies, such as Orchid Technology and Corvus, offered network cards for the PC, technical and support considerations made Ethernet a standout. The Ethernet cards are made by 3Com Corporation, a company with much experience in the Ethernet arena (see "Ethernet Comes To The PC," *PC*, Volume 1 Number 9). They produce cards for a variety of computers, but the PC card is the first to incorporate the newest generation of Ethernet chips, made by Seeq. Finally, Intel supports Ethernet and produces its own Ethernet chips (not yet available in quantities). With the knowledge that the PC is also composed of Intel parts, Ethernet became the obvious choice.

What is Ethernet?

Ethernet falls under the heading of a CSMA/CD network. This acronym stands for Carrier Sensing Multiple Access with Collision Detection. Every node of an Ethernet system is attached to the same physical wire. When a node is ready to transmit information it first checks the wire. If it finds the wire is already in use ("carrier sensing"), the node waits a short time and rechecks. If the wire is then available, the node begins transmitting. Two nodes may try to transmit simultaneously. If this happens, when each node detects the signals' collision, it aborts noisily, so everyone knows it. Each node then retries the connection at random intervals to minimize the possibility of locking up the system by having two stations continually colliding with each other.

The bandwidth of a standard Ethernet is 10M bps (10 million bits per second), which means that the data on a single standard disk can be transferred in about a tenth of a second. With the right booting program in ROM on each PC, there is no need to have any disk drives in the PCs for network operations. Much to our dismay, IBM has made it difficult to buy diskless PCs. Our attempt to purchase PCs without disks met with unwarranted suspicion from IBM that we would attempt to resell the PCs after putting in our own cheap drives.

Ethernet Hardware

Physically, Ethernet is simple. There is one interface card for each PC (cost is $950, including software) connected by RG-58 coaxial cable. The PC Ethernet cards are restricted to a maximum total line length of 300 meters, although high-power drivers are available that extend this range to 1,000 meters. The Ethernet protocol can easily support 50 to 100 computers. A significantly greater number of computers may be interconnected through "gateways," computers that are dedicated to connected multiple Ethernet lines.

3Com also sells an EtherShare Network Server (list price $11,500) that uses an Altos computer and a 10 megabyte hard disk for true multiple sharing. Xerox Corporation offers a number of machines that interconnect to Ethernet, including its well-known Star and Alto computers. Xerox will soon introduce several networked copiers and laser printers. Apple's new Lisa microcomputer will soon have Ethernet capability as well. Ethernet is supported by DEC, Intel, Xerox, Ungermann-Bass, and the European Computer Manufacturers Association. In addition, the Institute of Electrical and Electro-

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[1]For comparison purposes, typical professional configurations consist of 16-Bit 8088 Processor, 128K RAM with Parity, Dual 320K 5-inch Floppies, DMA and Interrupt Controller, Dual RS-232 Serial Ports, Centronics Parallel Port and Dumb Computer Terminal or Equivalent.

[2]Columbia Data Products also supports CP/M 80® with an optionally available Z-80 CP/M Expansion Board

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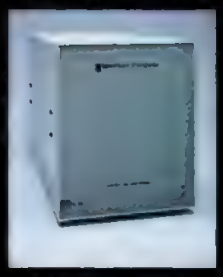
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Engineers (IEEE) has standardized much of the Ethernet interface, which should facilitate future upgrade paths.

Connecting a computer into an Ethernet couldn't be simpler. The Ethernet card plugs into the PC motherboard. This card provides a coaxial T-connector at the rear of the computer. The Ethernet's coaxial line is split at the computer with one end attached to each side of the T-connector. The whole process takes about 10 minutes. No specific line lengths or extra hardware are required. The computers at each end of the network have a terminating cap on the unused side of the T. A new machine is added by pulling off the cap, connecting the two computers, and replacing the cap on the new end machine. This connection can be made while Ethernet is running, since work will stop automatically until the line is capped again.

The hardware on the board takes care of all of network overhead. It handles retransmissions in case of collision and does error checking and address detection. Each card contains a 2K buffer, which looks like a parallel port to the computer, and can use DMA (direct memory access), much like a buffered disk controller card. Each card has a ROM with its Ethernet address inside; there is also room for a ROM that can boot diskless PCs. The address is a six-digit number that uniquely identifies that Ethernet port to the rest of the network. Although in principle, each card can read everything off the net, in practice messages are routed to specific destinations. Ethernet also allows public addressing, whereby every card receives the same message. This capability is also supported by the 3Com cards.

WHILE YOU are using someone else's disk drive or printer, no one else can use it—including the owner.

Ethernet Software

The Ethernet cards from 3Com come with a software system, called *EtherLink*, which handles disk drive and printer sharing in the network. This is not as convenient as it should be, primarily because PC-DOS was designed as a single-user system. Essentially, in order to use another computer's disk drives or printer, you need to yell down the hall to its owner, who then gives you access to his machine and temporarily locks himself out from using it.

EtherLink is composed of two main modules, PCServer and Link. PCServer asks which disk and printer to share. It also asks for your name. When PCServer finishes running, you are locked out from your own system until you hit the Ctrl-Break keys. Until then, anyone else can run the Link program to your machine and use your disk drive and your printer as his own.



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The advantage of this rather crude method is that disk and printer sharing is truly transparent. Once the link is created you can use the shared disk as if it were your own. All of the PC-DOS utilities, such as Diskcopy, Dir, and Erase, will work. The only difference is that the shared disk will do the operations. Even typing Shift-PrtSc (which copies the material on the PC screen to the printer) will dump the screen to the shared printer. Programs cannot tell that the disk or printer is physically connected to someone else's computer.

Read-Only Access

The cost of this approach is that while you are using someone else's disk drive or printer, no one else can use it—including the owner. I am presently working on a program that will alleviate this problem. Although the solution is rather simple, it must deal with numerous problems that can arise from the way PC-DOS handles the disk directory.

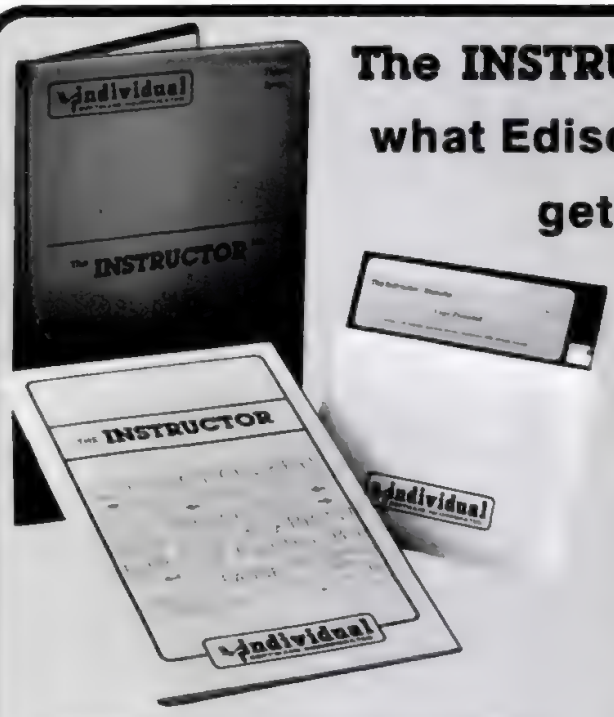
A disk directory is easy to ruin by having two people write to the same disk at the same time. Giving everyone read-only access is painless and trouble-free. Concurrent CP/M-86 or MP/M would solve the problem, but there is not yet enough good software available for these two operating systems. True multiuser access may have to wait for Xenix or MS-DOS 2.0. We expect to make read-only access (with one user having write access) feasible within the next few weeks. 3Com has been generous with its technical data; its employees have been helpful; and no real problems are expected.

ALTHOUGH IN principle, each card can read everything off the net, in practice, messages are routed to a specific destination.

The software that comes with *EtherLink* includes a diagnostic program that ensures the network is working correctly. The program seems to work well—in fact, all of the software seems to be very well written. The user documentation, even in its preliminary form, is very good, and we have yet to find a bug in the software. This bodes well for future extensions of the network.

Conclusions

In this project for the Independent Bankers Association of Georgia, I found the physical installation of Ethernet to be simple. It required about 2 hours the first time, and has since become even quicker. The net does what we wished, although the lack of a multiuser capability is irksome. This is not 3Com's or Ethernet's fault, but rather an inadequacy in the PC operating system. I wish that installing Ethernet was complex enough to require my consulting services—it really is almost too simple. */PC*



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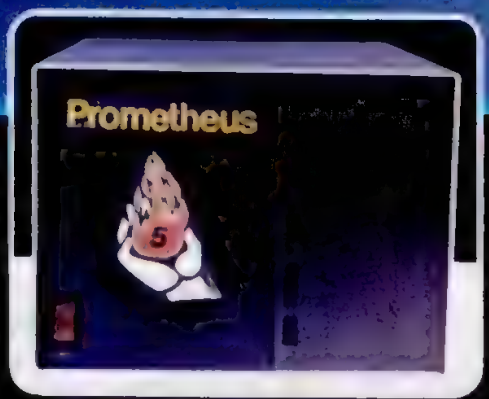
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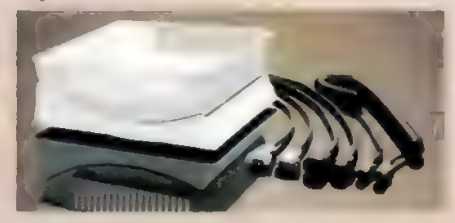
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How to re-arrange your IBM PC... very comfortably.



Tips on customizing your function keys to help make program development run smoother.

No Fault Key Definitions

When you invoke BASIC on the IBM Personal Computer, ten function key definitions are set and displayed on the bottom line. The first few definitions are quite useful, but some of them (such as TRON and TROFF) are rarely used. Changing the default key definitions greatly increases their usefulness. The technique is general, and each user can customize the keys to his or her individual preference.

Getting Started

First, let's examine how to change a key definition. The KEY statement is used to define up to 15 characters to be passed to BASIC whenever the specified key is pressed. If the last character in the definition is an ASCII 13 (represented as CHR$(13)), then the key definition is "entered" (the same as typing those characters and pressing Enter). If the last character is not 13, then the characters are merely displayed on the screen at the current cursor location.

Consider these two definitions:

```
KEY 1,"LIST "
KEY 2,"RUN"+CHR$(13)
```

Pressing function key 1 (F1) causes LIST to appear on the screen at the current cursor location, followed by a blank. The cursor is left positioned after the blank. The user can then type an operand for the LIST command (such as "10-100"), press Enter, and the command "List 10-100" will execute. If key F2 is pressed, the command RUN is displayed and executed, because the CHR$(13) is the same as pressing Enter.

MOST OF THE time, however, entire commands (or all but the operands) are contained in function key definitions.

If, instead of defining a command, a key is defined to be a meaningful string of characters (such as a common statement operand or expression), then pressing the function key could be used to add the characters to the existing line at the cursor location. For example, if we added the following key definition to the previous definitions:

```
KEY 3,"10–100"
```

then pressing F1 followed by F3 and Enter would be the same as entering the command LIST 10-100. This represents a legitimate and sometimes desirable use of function keys.

Undesirable Elements

Most of the time, however, entire commands (or all but the operands) are contained in function key definitions, and the fact that pressing the key adds the command to the end of the line is undesirable. Suppose, for instance, that you had started to type a command on the screen, changed your mind, and then pressed F1. The characters LIST would appear at the end of what you had previously typed, and you would probably get a Syntax Error when you pressed Enter. Fortunately, this problem can be avoided by the addition of an Escape (ESC) character at the head of the key definition. ESC is represented in a BASIC line as CHR$(27).

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sor is positioned at the head of the line. Thus, with the key definition:

```
KEY 1,CHR$(27)+"LIST "
```

the current line is cleared before the LIST command is entered. One slight problem is that in the display of the key definition on line 25 of the screen, the CHR$(27), appears as a left-arrow, the same character that shows up for CHR$(13). This problem can be eliminated by placing a representation of the true command as the first six characters in a key definition

WHEN THE ESC key is pressed, any text on the current line is erased.

(because the first six characters of the key definition are always displayed at the bottom of the screen), followed by the CHR$(27) and the command that is actually to be executed. Here is an example:

```
KEY 1,"LIST "+CHR$(27)+"LIST "
```

Here the characters LIST are displayed at the bottom of the screen, but the actual execution sequence is:

1. Display "LIST " at the current cursor position
2. Clear the current line (including the just-displayed "LIST ")
3. Display the command "LIST "

Clearing the Screen

Many users will find it desirable to clear the screen prior to executing various commands. LIST is a good candidate; RUN is another. CLS clears the screen, but because of the 15 character limit on key definitions—combined with the desire to show the correct command at the bottom of the screen—it usually cannot be used. For example, to combine CLS with LIST and still show the correct command, you would have to enter: KEY 1,"LIST " + CHR$(27)+"CLS"+CHR$(13)+"LIST ", which is 16 characters. Fortunately, there is a way to accomplish the clearing operation effectively. By using CHR$(12)

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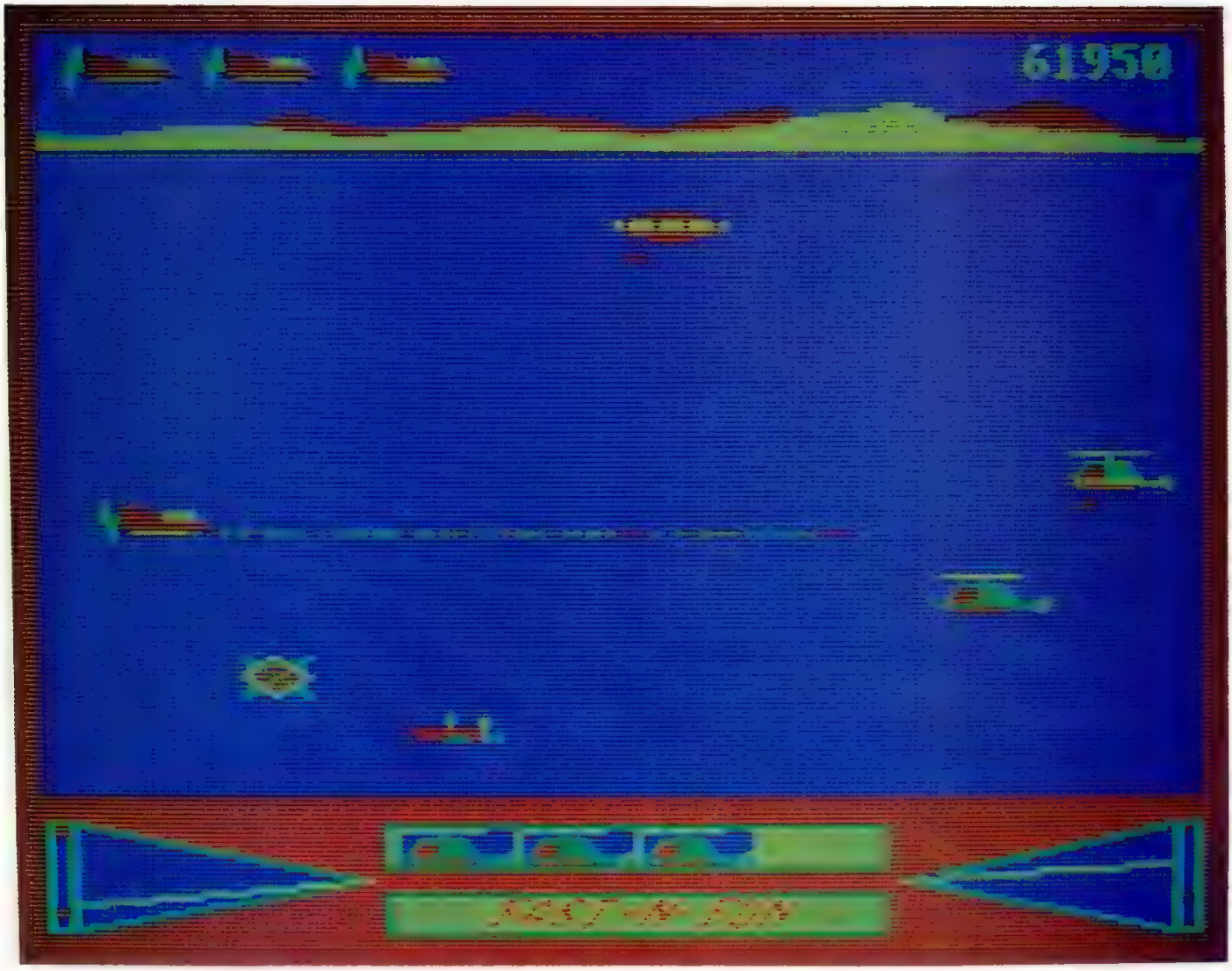
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instead of CLS to clear the screen, the ESC (CHR$(27)) and CLS functions are effectively combined.

The Program

The following is a portion of the program I use to set function key definitions:

```
10 SAVE "PFKS
20 KEY 1,"LIST  "+CHR$(12)+
   "LIST "
30 KEY 2,"RUN"+CHR$(27)+"   "
   +CHR$(12)+"RUN"+CHR$(13)
40 KEY 3,"LOAD"+CHR$(34)+"   "
   +CHR$(27)+"LOAD"+CHR$(34)
50 KEY 8,"LPRINT CHR$(12)"
60 KEY 9,"EDIT "+CHR$(27)
   +"EDIT "
70 KEY 10,"CLS"+CHR$(27)+"   "
   +CHR$(12)
80 KEY ON
90 NEW
```

Here is a detailed explanation of lines 10-70:

- Line 10: The SAVE makes sure that this program is automatically saved when you first run it. Otherwise, the NEW in line 90 would erase the entire program, unless you remembered to put it on your disk. You may want to remove this line after you've saved the program the first time.

MANY USERS will find it desirable to clear the screen prior to executing various commands.

- LINE 20: The "LIST " represents the six characters to be displayed on line 25 of your screen. The CHR$(12) clears the screen (including the "LIST " just placed on the line). The final "LIST " puts the real command you want on the line, starting in column 1 of line 1. The cursor appears in column 6, after the blank, awaiting an operand (such as 100-200), before you press Enter to execute the command. Pressing key 1 followed immediately by Enter is the same as entering LIST by itself. If you do not want to clear the screen prior to issuing the list, then replace CHR$(12) with CHR$(27), to clear only the line the cursor is currently on.
- LINE 30: The first six characters of this line appear as the key definition on line 25 of your screen. They are "RUN", plus a left-arrow (the visual representation of CHR$(27), which is also the representation for Enter), plus two blanks. The actual execution sequence is as follows: place "RUN" on the current line, clear the line (because of CHR$(27)), place " " on the line, clear the screen (CHR$(12)), place "RUN" on the top line, and execute the RUN (because the CHR$(13) is the equivalent of Enter).
- LINE 40: The first six characters again go on line 25 of your screen: "LOAD", a double-quote (CHR$(34)), and a blank. The CHR$(27) clears the line, and the same sequence is again placed on the line, minus the trailing blank. The cursor is positioned right after the quote, ready for the user to complete the line.
- LINE 50: Here the CHR$(12) is part of the text of the line — a request to "form feed" the printer. Because the complete text is 15 characters long, there is no room for a leading CHR$(27) to clear the current line.

  This line also points out a coincidental problem of using CHR$(12)—its dual function of clearing the screen or form feeding the printer. It may be apparent that the CHR$(12) could be included at the head of a command to clear the screen and then execute the following command, without going to the trouble of coding the command followed by blanks, etc. This works fine (with the CHR$(12) showing up on line 25 of your screen as the biological symbol for a female)—until you do a Prtsc (print screen). When line 25 is printed, each CHR$(12) form feeds the printer.
- LINE 60: This line is perhaps the simplest and most typical use of a key definition: the command (with blank padding to six characters), the ESC character, and the command again (followed either by a blank, if operands are optional, or CHR$(13) to execute).
- LINE 70: The first six characters represent the command again: CLS, an ENTER arrow, and 2 blanks. The CHR$(27) clears the line, the two blanks are put on the line, and then the screen is cleared. The

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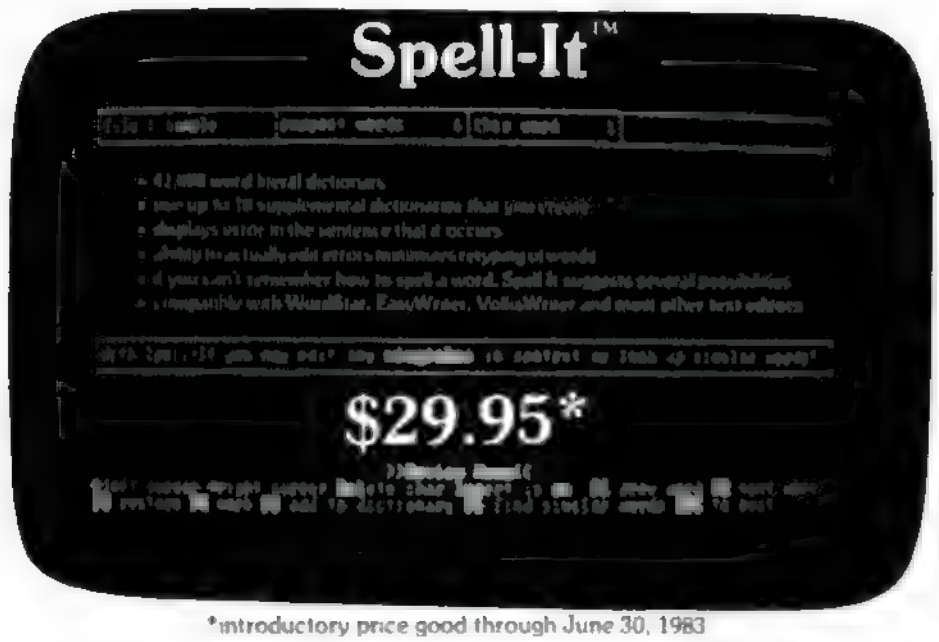
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cursor ends up on line 1, position 1.

Note that the command CLS is not actually executed. It could have been used instead of CHR$(12), but then "OK" would have been displayed on the top line, with the cursor on the second line.

FORTUNATELY, there is a way to accomplish the clearing operation effectively.

This points out that the command displayed on line 25 of your screen does not have to be what is actually executed.

Other Functions

There are other powerful CHR$(n) functions that can be used in KEY definitions. See the User-to-User column in Volume 1 Number 6 of PC. One final note: I have a BAT file called B.BAT which I use in DOS to invoke BASICA with my key definitions. When I boot up DOS, all I have to do is hit B then Enter and the PC loads BASICA and sets the function keys automatically. (See the DOS manual on how to set up such batch files.) B.BAT is one-line long:

```
BASICA PFKS
```

I end the line with ASCII 26 (entered by holding down the ALT key and pressing 026), to cause the BAT processor not to come back to B to read another line after ending BASICA (that eliminates an unnecessary "A>" prompt). When I type B, BASICA is invoked; and program PFKS (my function key definitions) is run.

Note that the PFKS program ends with the two commands KEY ON, to display the key definitions on line 25; and NEW, to clear out the PFKS program, leaving an empty work space. The response from running B is "OK" at the top of the screen and my customized function key definitions on the bottom line. Obviously, a PRINT statement could be added before statement 90 to present a customized message ahead of "OK". Happy customizing! */PC*

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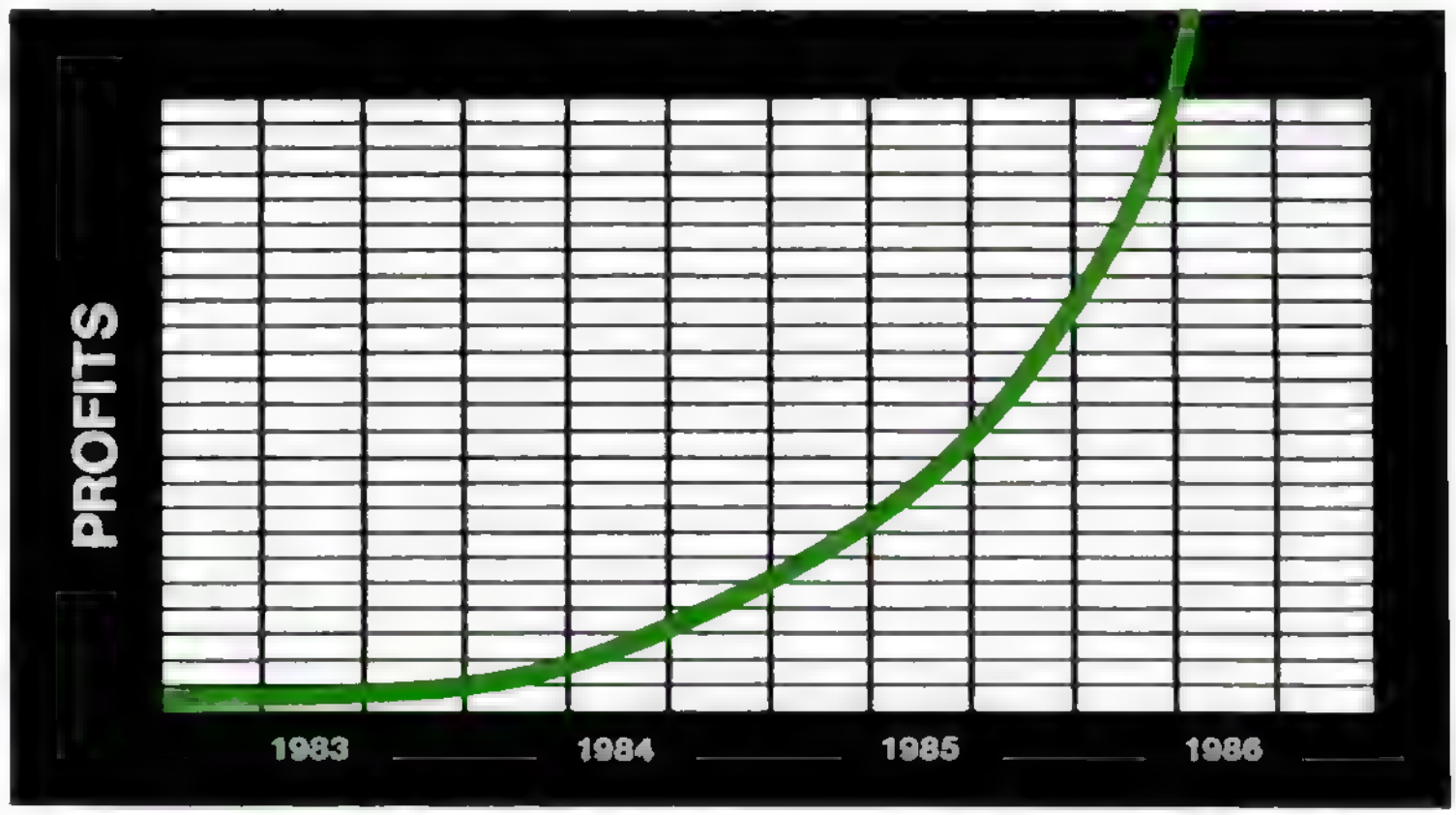
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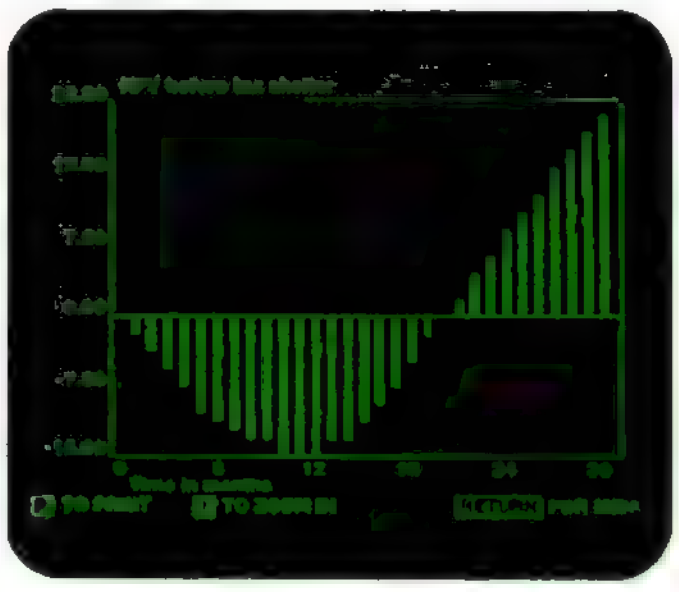
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LANGUAGES/FRED BRACK

Manipulating character strings in BASIC requires a review of the language and an understanding of how it responds to your commands.

The Fundamentals Of BASIC

Programmers frequently must work with data made up of characters rather than numbers. There are over a dozen statements and functions in BASIC to process such character data.

In BASIC, character data is referred to as string data—a string of characters enclosed within double quotation marks ("ABC"). Strings can contain any amount or type of characters (alphabetic, numeric, special symbols). Strings are differentiated from numeric data, which does not appear within quotes, and which can contain only numbers and an optional sign (123. or −5). It is important to understand the difference between the *number* 123 and the *string* "123". The number can be manipulated arithmetically (multiplied, subtracted, etc.) by BASIC statements, but the string cannot.

BASIC always knows what kind of data to expect in a given variable by the *default*, *defined*, or *explicit* definition of the variable name. By *default*, all variable names are considered to be single-precision numbers. Most people put a "DEFINT A-Z" statement at the start of their program to re-define all variables as integers. If a variable is not to be treated as either the default or redefined type, then it can be explicitly defined by making the last character of the variable name a $ (for string), or a %, !, or # (for integer-, single-, or double-precision numeric).

BASIC always knows what kind of data to expect in a given variable name.

In this article (and almost always in practice), character variables will be defined explicitly, by a name that ends in a $. Thus, the statement I=A$+1 will cause a TYPE MISMATCH error in BASIC, because BASIC knows that A$ is character data and cannot participate in arithmetic operations. In fact, the statement I=A$ is also invalid, because a string value cannot be directly assigned to an integer variable, even if the string is composed only of numbers.

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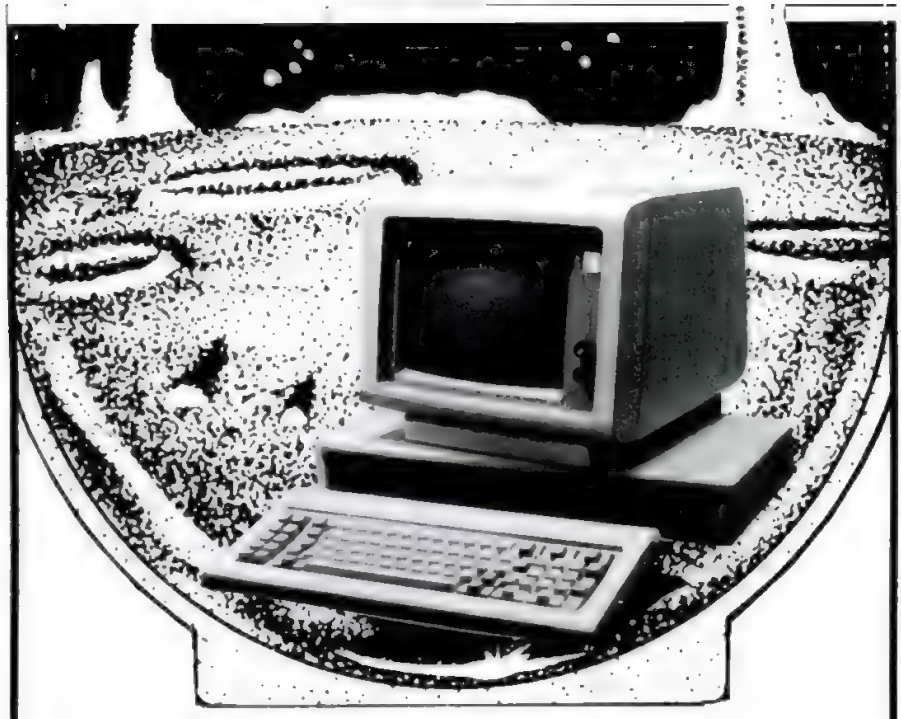
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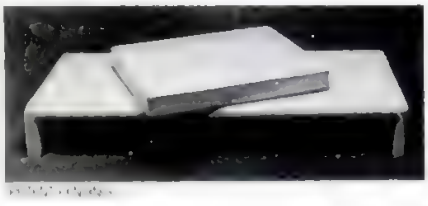
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Converting Variables

It is often necessary to convert an integer to a character value and vice versa. BASIC provides two statements that are essentially opposites: STR$, which converts a numeric value to a string; and VAL, which converts a string to a numeric value.

STRINGS are differentiated from numeric data, which does not appear within quotes, and which can contain only numbers.

Let's look at the examples mentioned earlier: I=A$, and the reverse, A$=I, both of which cause TYPE MISMATCH errors. Looking at the second case first—creating a character string out of a numeric value—we use the STR$ function as follows:

```
A$=STR$(I)
```

Now assume that the value of I is 100. After executing this statement, the variable A$ contains the string " 100". Note the leading blank. STR$ reserves that space for the arithmetic sign, in case the number is negative. (PRINT does the same thing when printing numeric values.) If the number is positive, the leading blank may be undesirable, and you may remove it.

Consider the requirement to store the result of a calculation, RESULT, as part of a message (MESSAGE$). Using STR$, you might code:

```
MESSAGE$="The answer is "
         +STR$(RESULT)
```

Note that a string can be created from several components by using a plus sign between the components. The first com-

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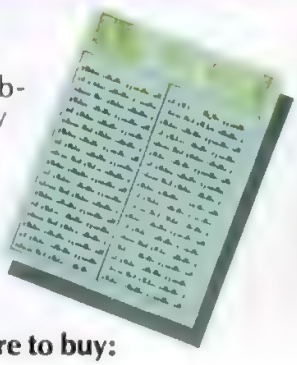
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ponent is "The answer is", and the second component is STR$(RESULT). The number that RESULT represents is converted into a string, and that string is "concatenated," or added to "The answer is ".

Assuming that RESULT equals 100, MESSAGE$ now contains:

```
The answer is   100
```

Note the *two* blanks before the "100"—one from the first string, and one as the place-holder for the sign of the result of the STR$ operation. If RESULT had been negative 100, the second blank would have been replaced by a minus sign, and MESSAGE$ would read:

```
The answer is -100
```

THE confusion arising from the use of VAL is one of the main reasons this article is being written!

If you are sure the result is positive, you could have coded your original statement as:

```
MESSAGE$="The answer is"
         +STR$(RESULT)
```

and only one blank would appear before the "100". You could also put a period at the end of the sentence by concatenating an additional string consisting of a period in quotes. With BASIC's direct mode of operation, such experimentation is easy at the terminal. You could type the following statements, varying them slightly each time:

```
RESULT=100
MESSAGE$="The answer is"
+STR$(RESULT)+"."
PRINT MESSAGE$
The answer is 100.
```

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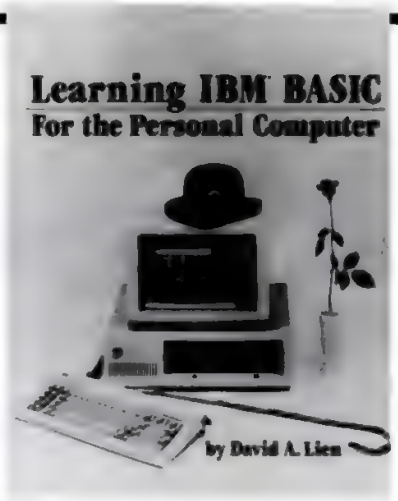
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posed the expression I=A$, and said that VAL would help us in the conversion. We would use it as follows:

```
I=VAL(A$)
```

The variable I could now be used in computations such as RESULT=5*I+10. There is one slight problem, however. VAL operates with only as much of the string as it interprets as numeric. As soon as it hits a character other than a number, arithmetic sign, or blank, it ignores the rest. For a totally non-numeric field, VAL returns a 0. For example:

VAL OPERATES with as much of the string as it interprets as numeric.

```
I=VAL("123")      yields  123
I=VAL(" 123")     yields  123
I=VAL("123 ")     yields  123
I=VAL("-123")     yields -123
I=VAL("ABC")      yields  0
I=VAL("A12")      yields  0
I=VAL("12C")      yields  12
```

The last example illustrates the danger in relying solely on VAL to perform conversions. Many people assume that if a non-numeric character appears anywhere in the string, that VAL will return a zero. This is not true. VAL returns a zero only when the first non-blank character it encounters is not numeric (or an sign). To validate a supposedly numeric field, examine the field character by character. Only when the field has passed the numeric test can VAL be used safely.

Another common string function is LEN, which returns the length of a given string. Here one must keep in mind that the length of a string includes *trailing blanks*. There is no simple way to remove trailing blanks in BASIC for this must be accomplished in a subroutine, looking at the string character by character.

Like other BASIC statements and functions that take a string as an operand, the string can either be a variable or a literal. For example:

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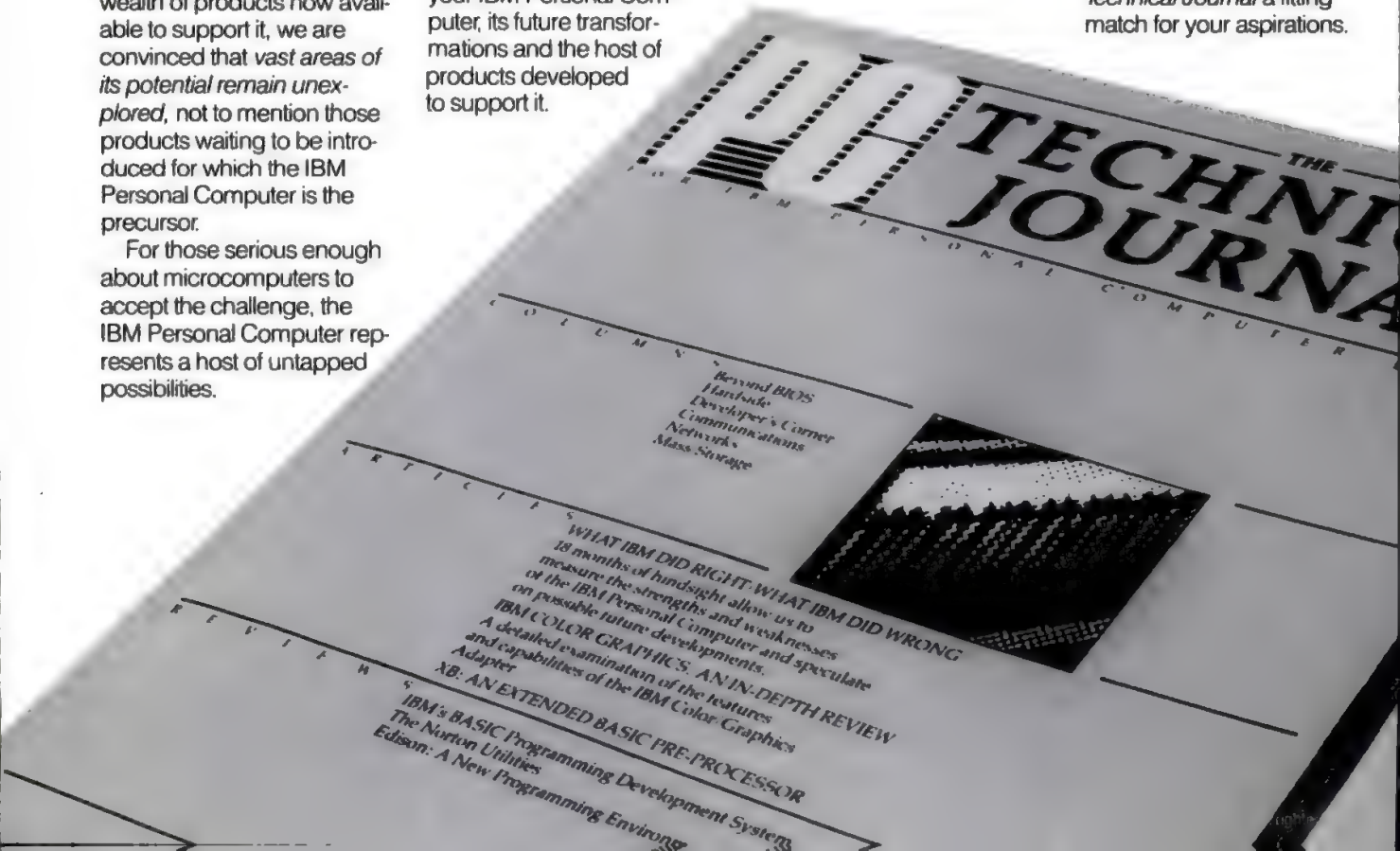
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CIRCLE 402 ON READER SERVICE CARD

```
I=LEN("ABC")          yields 3
I=LEN("123 ")         yields 4
I=LEN(MESSAGE$)       yields the
   number of characters in
   MESSAGE$
I=LEN(MESSAGE$+A$) yields
   the number of characters in
   the string formed by the
   concatenation of MESSAGE$
   and A$
```

Taking Strings Apart

A string may be broken into sections of one or more characters by using the LEFT$, RIGHT$, and/or MID$ functions. Here are some more examples:

```
A$="THIS STRING"
B$=LEFT$(A$,4)     yields "THIS"
C$=RIGHT$(A$,6)    yields "STRINC
D$=MID$(A$,4,3)    yields "S S"
```

ONLY WHEN the field has passed the numeric test can VAL be used safely.

In the last example, the MIDdle of A$ is extracted, beginning at the 4th character, for a length of 3 characters. When used on the right-hand side of an equation, MID$ is a "function." It can also be used as a "statement" by moving it to the left of the equal sign. For example:

```
MID$(A$,3,2)="AT"
```

changes the value of A$ from "THIS STRING" to "THAT STRING". One very important point to observe about the statement form of MID$ is that it changes a portion of an existing string, rather than defining a new one. The actual storage location of the string—and its length—do not change. MID$ on the left cannot be used to extend a string beyond its original length. On the other hand, it offers an efficient reuse of storage without allocating additional space for a new string, as is often done when only a variable name appears on the left.

Sometimes it is useful to deal with the ASCII character set values of variables, instead of the string notation (the ASCII

value of the letter a is 97). This is used to translate letters from upper- to lowercase and vice versa, to convert letter values to numeric offsets from 0, etc. The ASC and numeric field validation and/or trailing blank removal.

CHR$ IS commonly used to send a "special" character to the screen or printer.

CHR$ functions translate back and forth between ASCII and string values as follows:

```
ASC("c") returns the ASCII
         code of the
         character "c"
ASC(A$)  returns the ASCII
         code of the
         first character of A$
CHR$(n)  returns a 1-character
         string of ASCII code n
```

CHR$ is commonly used to send a "special" character (one which does not have a readily-available keyboard equivalent) to the screen or printer. Examples include CHR$(27), the "escape" character, and CHR$(12), a forms feed for the printer (e.g., PRINT CHR$(12)). Operators must understand the difference between STR$ versus CHR$, and VAL versus ASC.

Here is an example using four of the functions we have looked at so far. To convert the value of a variable R$ to uppercase, the following statements could be used:

```
1000  FOR I=1 TO LEN(R$)
1010  J=ASC(MID$(R$,I,1)) 'Get
      ASCII value of next char
1020  IF J<97 OR J>122 THEN
      1050 'Test if J between
      "a" and "z"
1030  J=J-32 'Yes - change value
      to uppercase
1040  MID$(R$,I,1)=CHR$(J)
      'Replace char with
      uppercase
1050  NEXT
```

Code somewhat similar to the above can be used for the previously mentioned

Combing Functions

Another useful function is INSTR—"instring"—which locates the first occurrence of one string inside another.

```
INSTR(n,X$,Y$)
```

returns the *position* of the first occurrence of string Y$ in string X$, starting at position "n" ("n" is optional); it returns 0 if Y$ is not found.

Let's look at an example of INSTR, emphasizing the possibilities of combining several functions into one line of code. Suppose you wanted to find the first blank in an input field, so you could separate out the first word for further examination. Since we want to start searching for the blank—right at the start of the line—we can leave off the "n", defaulting to 1. If the input string were

SOMETIMES it is useful to deal in the ASCII character set values of variables, instead of the string notation.

"COMMAND$", then you might code:

```
LOC.BLANK=INSTR(COMMAND$," ")
          'find location of
          blank
LTH.WORD=LOC.BLANK-1 'calc
         length of word before
         blank
FIRST.WORD$=LEFT$(COMMAND$,
LTH.WORD) 'extract first word
      - or you can use -
LTH.WORD=INSTR(COMMAND$,
         " ")-1
FIRST.WORD$=LEFT$(COMMAND$,
            LTH.WORD)
      - or you can use -
FIRST.WORD$=LEFT$(COMMAND$,
            INSTR(COMMAND$,"
            ")-1)
```


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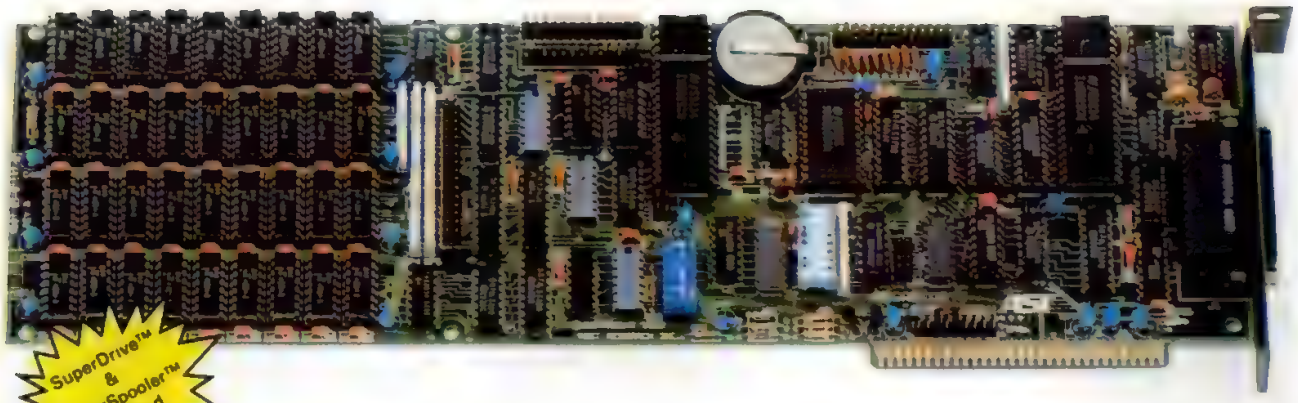
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Figure 1: Examples of character string functions and statements and the results they yield.

```
THIS STATEMENT                          RESULTS IN:
- - - - - - - - - - -                  - - - - - - - - - - -
PRINT "A=";STR$(-1)                    A=-1
PRINT "A=";STR$(1)                     A=1
PRINT "A=";MID$(STR$(1),2)             A=1
PRINT "A=";RIGHT$(STR$(1),1)           A=1
PRINT "A=";RIGHT$(STR$(123),1)         A=3
PRINT "A=";MID$(STR$(123),2)           A=123
PRINT "A=";val("1")                    A=1
PRINT "A=";val(" 123")                 A= 123
PRINT "A=";val(" 1AB")                 A= 1
PRINT "A=";val(" -2-3-4")              A=-2
PRINT "A=":val(" -2 3 4")              A=-234  <== Note!

D$="821225"
PRINT MID$(D$,3,2)                     12
PRINT MID$(D$,3)                       1225
PRINT RIGHT$(D$,LEN(D$)-4)             25
PRINT MID$(D$,3,2);"/";RIGHT$(D$,2);"/";LEFT$(D$,2)
                                       12/25/82

PRINT STRING$(10,"=")                  ==========
PRINT STRING$(10,97)                   aaaaaaaaaa
PRINT STRING$(10,"ABC")                AAAAAAAAAA
PRINT STRING$(5,"A");SPACE$(5);"B"     AAAAA     B

A$="ABCDE"
B$="BCD"
PRINT LEN(100)                         TYPE MISMATCH
PRINT LEN("100")                       3
PRINT LEN(A$+B$)                       8
PRINT ASC("A");" ";ASC(B$)             65  66
PRINT CHR$(97);CHR$(65)                aA
PRINT INSTR(A$,"E")                    5
PRINT INSTR(A$,B$)                     2
PRINT INSTR(3,A$,B$)                   0
PRINT A$+" "+B$+STR$(LEN(A$+B$)+1)     ABCDE BCD 9
PRINT HEX$(15)                         F
```

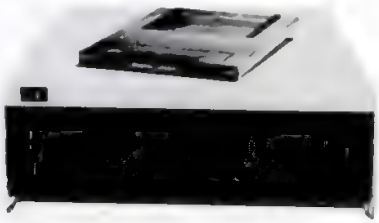
This example is illustrative of technique only. It is not a particularly "good" piece of code because if there were no blank in COMMAND$, then INSTR would return a zero, and the LEFT$ function would fail. Some miscellaneous string functions are as follows:

	RETURNS A STRING OF
SPACE$(n)	"n" spaces (blanks)
STRING$(n,m)	length "n" whose characters are all ASCII code "m"
STRING$(n,"c")	length "n" whose characters are all "c"
STRING$(n,A$)	length "n" whose characters are all the same as the *first* character of A$
HEX$(n)	the hexadecimal value of the decimal number "n"
MKI$(n)	length 2-bytes, identical to the integer value n (not a string) - the integer value stored in A$, previously stored by MKI$

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STRING$ is useful for creating lines with repetitive characters in them, such as screens with "=" signs on either side of a centered title. HEX$ is useful in dumping screens when debugging.

Switching Forms

The use of MKI$ and CVI is not so obvious. Along with MKS$ and MKD$ (for single- and double-precision values), MKI$ is used primarily in preparing integer data for storage in a random file buffer. Likewise, CVI (and CVS and CVD) are used to extract numeric data from the same buffer after a GET operation. However, its use extends beyond moving data.

One can "read" the name "MKI$" as "MaKe Integer a string ($)," while CVI stands for "ConVert to Integer." The functions are really used to *trick* the BASIC interpreter into allowing using numeric values where string values are normally used, and vice versa. Although the term "convert" is used, no conversion actually takes place.

An integer is stored in a 2-byte field. When an integer value is referenced in the function MKI$, that same 2-byte field is moved, *unmodified*, into a character string. The CVI function reverses the process, pulling two "string" characters out and interpreting them as numeric.

So what is the value of this information? Suppose you had a random file containing names and addresses. You wish to sort the file by last name and print the results. First you read every record sequentially, saving only the last name in an array, which is then sorted. Now, because you didn't have room to save the rest of the data in the array, you need to go back and read each record again, in the sorted order. To do so, you will have had to save the record number, along with the last name. MKI$ allows you to do this, by

AN INTEGER is stored in a 2-byte field. When an integer value is referenced in the function MKI$, that same 2-byte field is moved, unmodified, into a character string.

tacking the record number (an integer value) onto the end of each last name string in the array, as follows:

```
1000FOR RECNUM=1 TO MAXREC
1010GET #1,RECNUM
1020ARRAY$(RECNUM)=LASTNAME$
    $+MKI$(RECNUM)
1030 NEXT
```

The LASTNAME$ field (defined earlier in a FIELD statement) is transferred to ARRAY$, and its originating record number is stored with it. The use of MKI$ is not concerned with the random file buffer itself, but rather with the current record number. Later, when the array is sorted and read back, the record number could be retrieved by the statements:

```
2000 LNAME$=LEFT$(ARRAY$(I),
     LEN(LASTNAME$)) 'Pick off
     last name
2010 RECNUM=CVI(RIGHT$(ARRAY
     $(I),2)) 'CVI the last two
     bytes
```

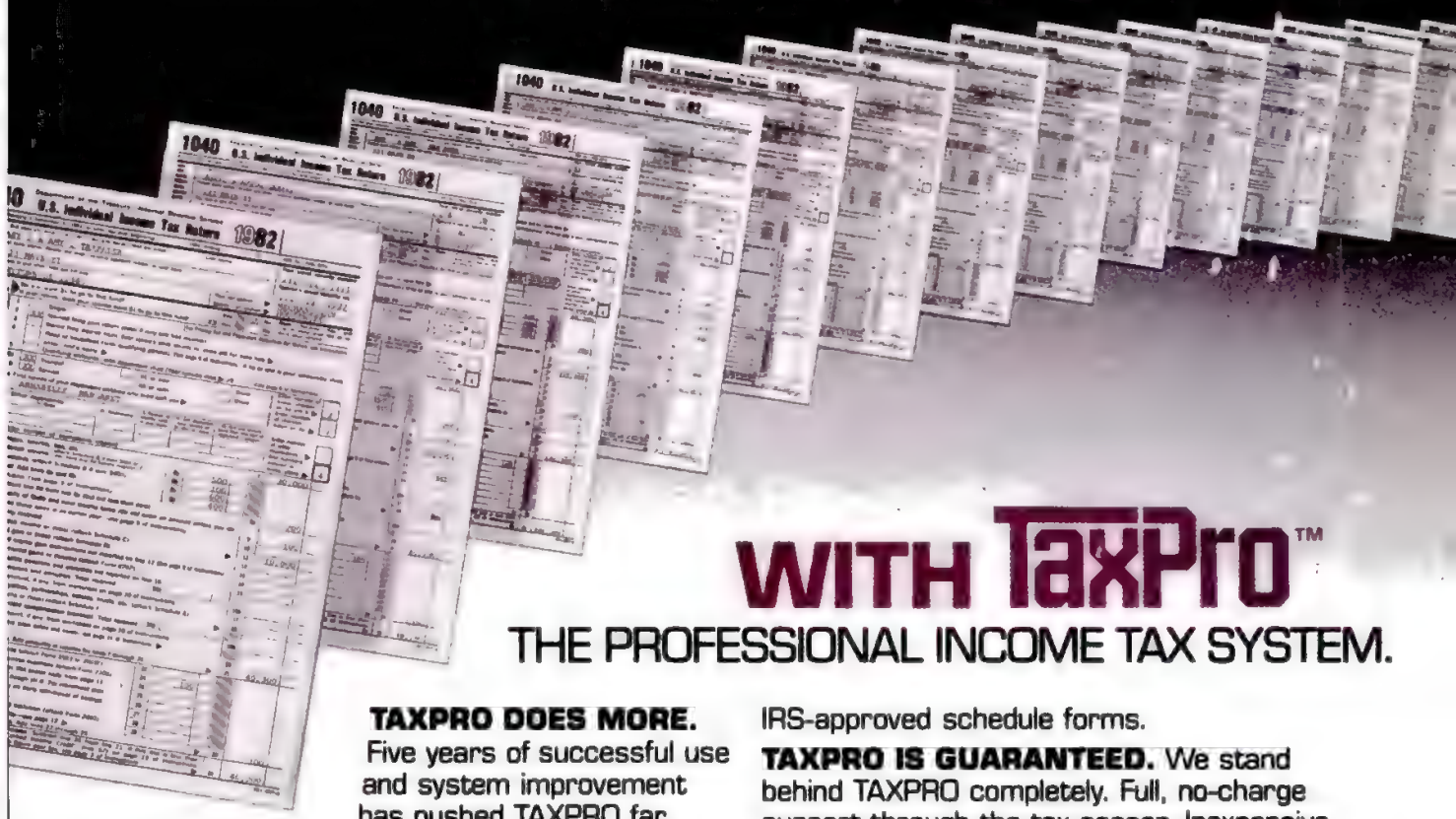
Study the examples (see Figure 1) of character string functions and statements, and the results they yield. If you really want to make sure you understand, cover up the right hand column, writing down what you think the result will be. Use BASIC in "direct" mode to experiment, too.

Keep in mind that a PRINT of an integer value results in a blank before—for positive numbers—and after each integer. */PC*

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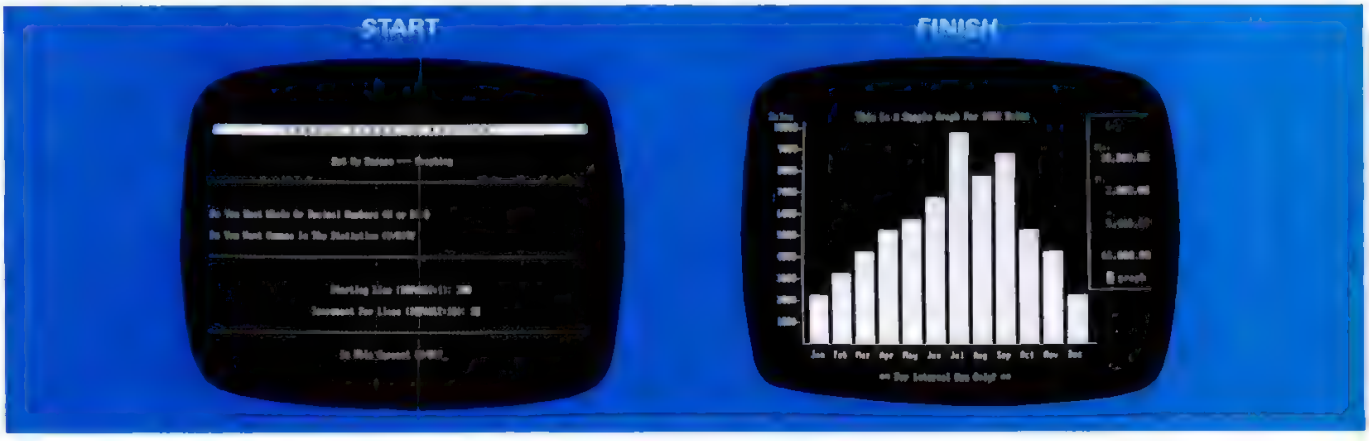
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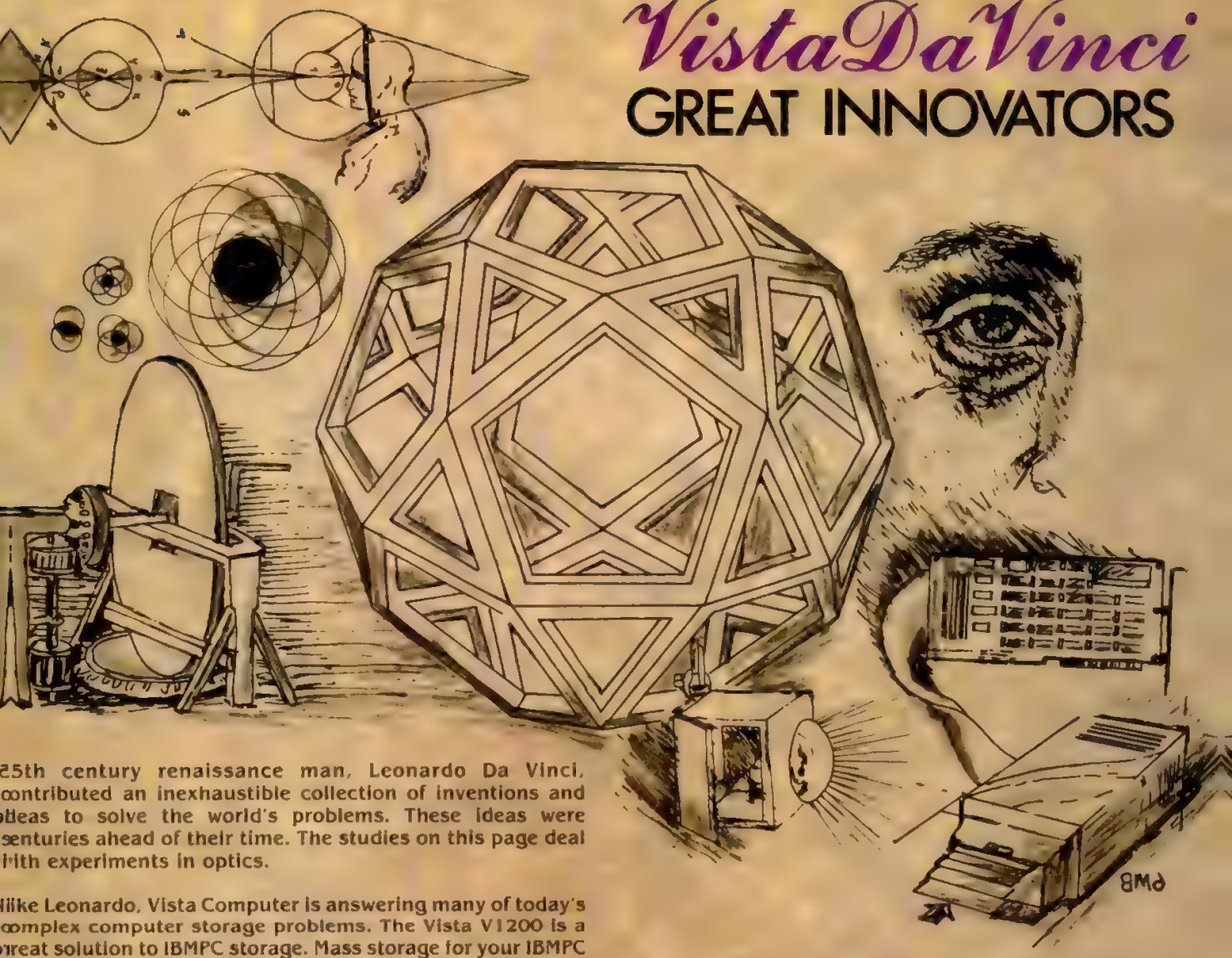
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Micro Cookbook
Virtual Combinatics
P.O. Box 755
Rockport, MA 01966
(617) 546-6553

List Price: $40
Requirements: 64K, at least one disk drive. Can use monochrome or color/graphics boards and displays. Printer optional.

CIRCLE 692 ON READER SERVICE CARD

Diet Monitor
Camrass Corporation
P.O. Box 118
Boonton, NJ 07005
(201) 328-8917

List Price: $69
Requirements: 64K, two disk drives, printer (IBM dot matrix or Epson recommended).

CIRCLE 693 ON READER SERVICE CARD

Presenting the ultimate menu-driven programs: In *Micro Cookbook* you feed your PC some information and it helps you prepare dinner. Then *Diet Monitor* will scold you for abusing your body.

Frankly, I get more pleasure from a lunch than from a lecture. For this reason and others, I found the well-designed-and-presented *Micro Cookbook* the more appetizing of the pair.

Micro Cookbook does not convert your disk drives into a toaster or your monitor into a microwave oven. What it does is offer a specialized database for cooks and bottle-washers: You can thumb through its electronic pages in search of an interesting recipe. If you've got a yen for a Chinese dish or a sudden urge for a piece of pizza, you can ask the program for suggestions from its Oriental or Italian repertoire. Or, you can tell the program some of the contents of your pantry and see if there are any matches. *Micro Cookbook* can print out a shopping list to take to the grocery store, outlining all of the ingredients for your selections (see Figure 1).

The program will also scale up or

```
**SHOPPING LIST

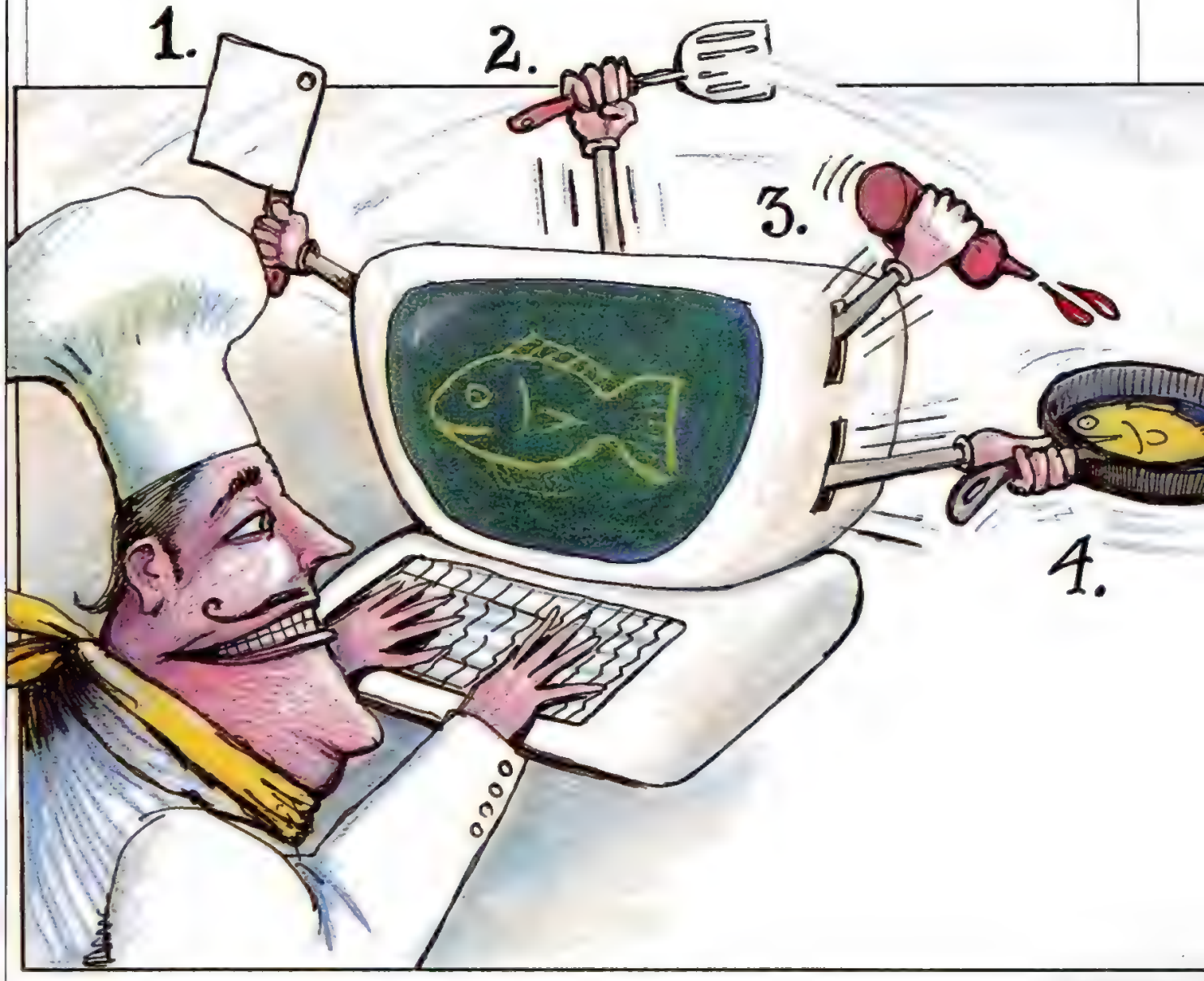
BASIL              BAMBOO SHOOTS      BEAN SPROUT
BUTTER             CELERY             CHICKEN BROTH
CHEESE             CORNSTARCH         GARLIC
ONION              PARSLEY            PEANUT OIL
PIGNOLI            RICE               SALAD OIL
SALT               SOY SAUCE          SPAGHETTI
WATER              WATER CHESTNUT     WHITE PEPPER

INGREDIENT      RECIPE                QTY   MEASURE   PREPARED

BASIL           PESTO SPAGHETTI       1     tbl
BAMBOO SHOOTS   CHINESE VEGETABLES    ⅓     cup
BEAN SPROUTS    CHINESE VEGETABLES    1     16 oz     can
BUTTER          PESTO SPAGHETTI       2     tbl
CELERY          CHINESE VEGETABLES    2     cups      sliced
CHICKEN BROTH   CHINESE VEGETABLES    1     10 oz     can
CHEESE          PESTO SPAGHETTI       ¾     cup       parmesan
CORNSTARCH      CHINESE VEGETABLES    2     tbl
GARLIC          PESTO SPAGHETTI       2     cloves    minced
ONION           CHINESE VEGETABLES    1     cup       sliced
PARSLEY         PESTO SPAGHETTI       1     cup       minced
PEANUT OIL      CHINESE VEGETABLES    2     tbl
PIGNOLI         PESTO SPAGHETTI       ¼     cup       minced
RICE            CHINESE VEGETABLES                    cooked
SALAD OIL       PESTO SPAGHETTI       ½     cup
SALT            PESTO SPAGHETTI       1     tsp
SOY SAUCE       CHINESE VEGETABLES    1     tbl
SPAGHETTI       PESTO SPAGHETTI       1     pkg       thin
WATER           PESTO SPAGHETTI       2     tbl       boiling
WATER CHESTNUT  CHINESE VEGETABLES    ⅓     cup
WHITE PEPPER    PESTO SPAGHETTI       ⅛     tsp
```

Figure 1: Example of a shopping list and recipe outline produced by Micro Cookbook.

Dinner?





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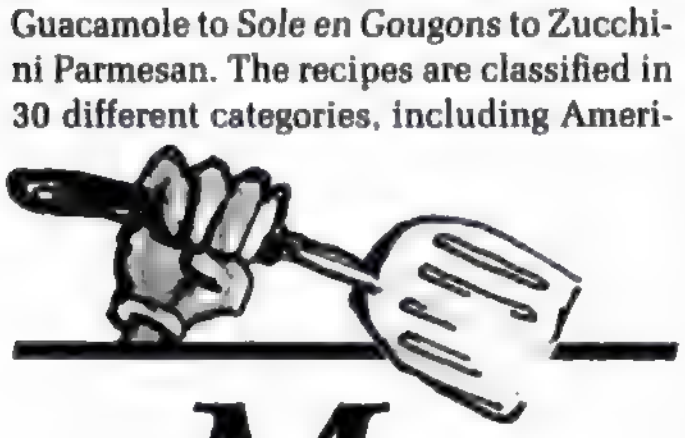
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CIRCLE 240 ON READER SERVICE CARD

down the quantity of most ingredients to serve a particular number of people. It includes definitions of cooking and preparation terms (see Figure 2); hints on buying and storing fruits, vegetables, and meats; a list of ingredient substitutions; and a calorie and nutrition guide.

Ethnic Diversity

Micro Cookbook comes with its own "Basic Recipes" disk. A sort of computerized Betty Crocker, it offers about 150 recipes, ranging from Almond Chicken to Guacamole to *Sole en Gougons* to Zucchini Parmesan. The recipes are classified in 30 different categories, including Ameri-



MICRO cookbook may be just the appetizer in a whole series of add-on modules.

can (Beef Stew and Corn Fritters), Jewish (Kasha Salad and Honeyed Chicken) and Vegetarian (a tempting Lemon Broccoli). There is even a category for "English cuisine," in some quarters a contradictory term. The single selection, London Broil, may be someone's muted joke.

The program can handle as many as 255 recipes on a disk, with 255 unique ingredients and 60 classifications. *Micro Cookbook* also allows you to create your own library of favorite dishes. You are asked (by a menu, of course) to fill out a form with ingredients, quantities, and cooking methods.

The program comes with an attractively prepared 32-page manual. The instructions on booting up the disk and some of the operating directions are not presented very clearly, though, and the book could use better organization. A number of important instructions and a few additions and changes to the program are not even in the manual. They can be found by calling up the RELEASE.EXE file on the program disk. A handful of misspellings (including a recurring "Quanity" label on the screen) mar the otherwise careful production. And the manual insists on calling the left-arrow cursor key (below the 4 on the numeric keypad) the "backspace key."

Legal Indigestion

The program is not copy-protected. The company combines a bit of the carrot and breadstick in its opening copyright notice: "Virtual Combinatics has invested over two man-years and considerable money developing this product for you, and has priced it low enough so that all computer owners can afford to buy it. Giving a copy to a friend is a violation of copyright laws—we consider it stealing. . . . Virtual Combinatics will pay a $500 reward for information leading to the arrest and conviction of any person or persons making illegal copies of the software diskette or users guide."

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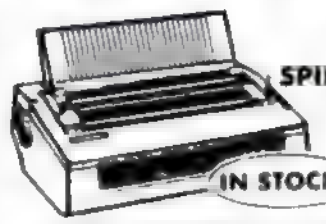
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CIRCLE 242 ON READER SERVICE CARD

index
- Select recipes from the ingredient index
- Select recipes from the classification index
- Select a recipe by ingredients and/or classifications
- Enter, modify or remove a recipe
- Examine a terminology or measurement glossary
- Prepare a printed shopping list or printed recipe;
- Examine a help screen for various options.

Choices are made using the ten function keys. You can move within the various menus by using the Esc key, and make a selection with the aid of the Ctrl and C combination.

A modest text editor is included in *Micro Cookbook* to allow entry and correction of selections and ingredients entered onto the screen. The system is adequate to the task, but as noted earlier, the choice of the left-arrow for backspace in lieu of the backspace key was confus-

```
CHOP: Cut into pieces using a
   sharp tool. Hold knife tip
   down with one hand and move
   blade up and down, chopping
   food with the other.

CRUSH: Press with garlic
   press, side of knife, or
   mallet to extract the juice
   of an ingredient.

CUBE: Cut into cubes of a half
   inch or larger.

DICE: Cut into cubes of a half
   inch or less.

GRATE: Cut into tiny pieces
   using the small holes of a
   grater.

MODE: REFERENCE

JULIENNE: Cut into small
   sticks.

MINCE: Cut into very small
   pieces. Smaller than chop
   but not crushed.

PARE: Cut off the outer
   covering with a sharp tool.

PEEL: Strip off the counter
   covering.

SHRED: Cut into thin pieces
   using the large holes of a
   grater.

SLIVER: Cut into long thin
   pieces.

SNIP: Cut into very small
   pieces without any chopping
   action, using scissors.
```

Figure 2: Glossary of preparation terms from Micro Cookbook.

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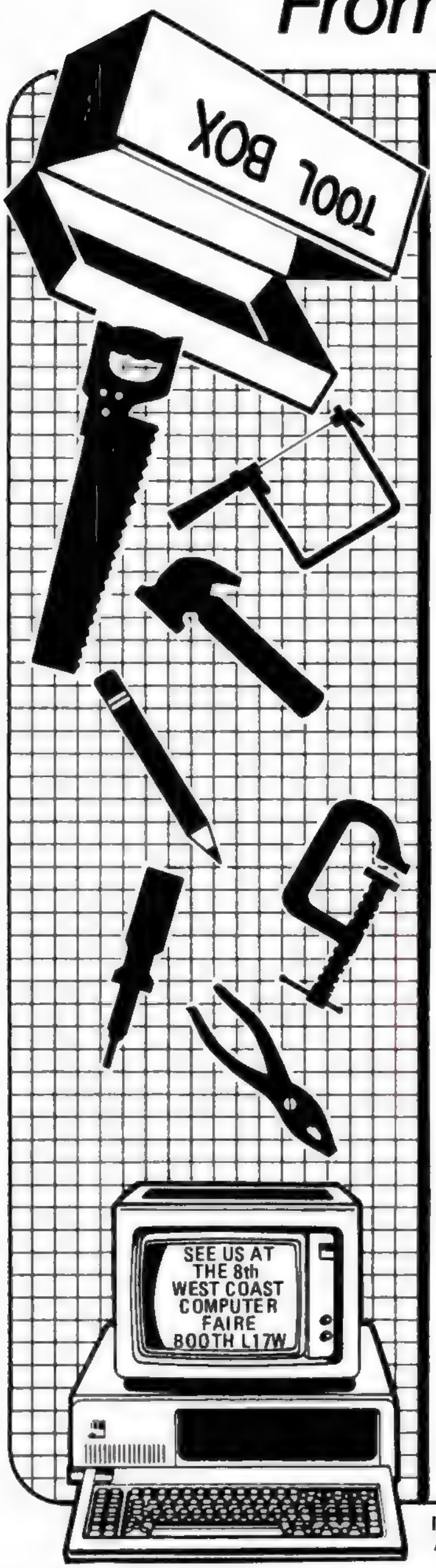
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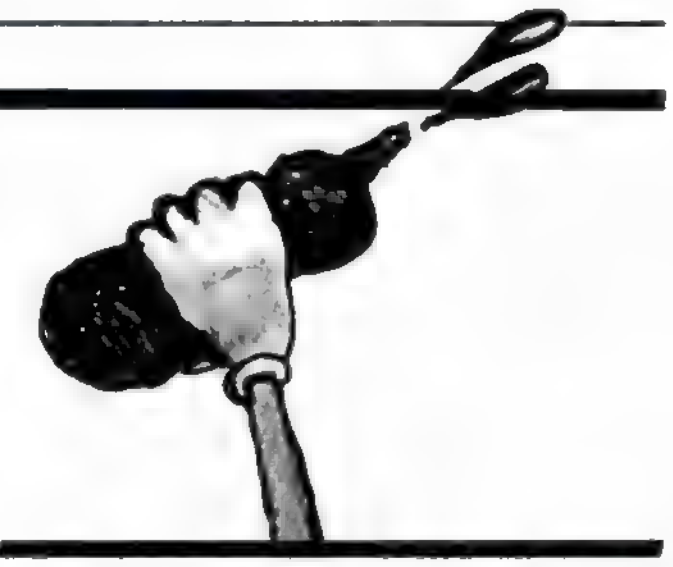
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ing.

The shopping list function is valuable. It will combine into one list several dishes you have selected, although it does not automatically weed out items already on your shelf. It includes some rather weak humor: "Run out and buy some water to cook that spaghetti," it advises.

The database system works well. The program is very strict in its requirements. There are no global searches or partial searches, for example. If you want to know about berry recipes, you'll have to ask specifically for strawberries or raspberries or blueberries. The program will correct for singular/plural discrepancies; though. Asking for onion will also yield information on onions.



A HANDFUL OF misspellings mar the otherwise careful production.

According to another billboard accessible from within the program, *Micro Cookbook* may be just the first in a whole series of add-on modules. Future offerings might include additional recipe books, nutritional analysis, a kitchen inventory package, and a commercial version for large kitchens.

All in all, *Micro Cookbook* is a tasty morsel for your PC.

Diet Monitor

However, *Diet Monitor*, from Camrass Corporation, is a whole other kettle of fish. It is a very ambitious, earnest program, but in the end it's an inelegant creation, sort of a collapsed soufflé.

The program is designed to perform a complete nutritional analysis of all the food you've eaten in a particular day or during the week. The analysis is compared to the Recommended Daily Allowance calculated for your age, sex, weight, frame, and activity level. The program can also factor in pregnancy, and can be biased to look for particular levels of nutrients, vitamins or other substances you may require.

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CIRCLE 291 ON READER SERVICE CARD

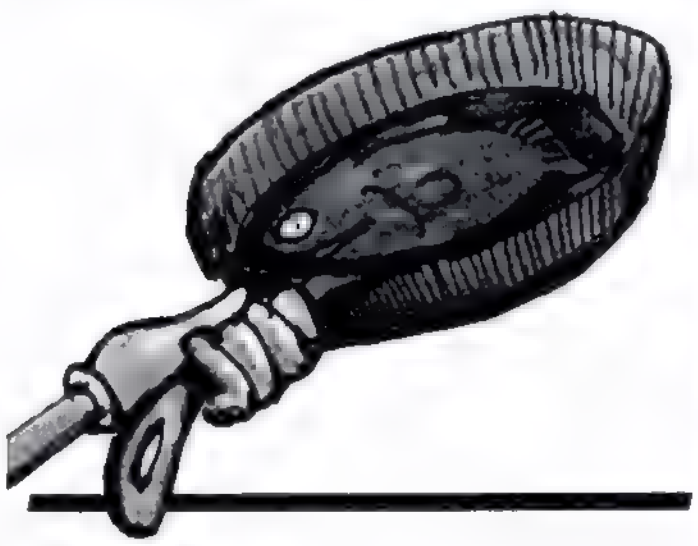
finally, you're presented with several pages of recommendations for altering your diet to address those deficiencies or excesses.

Difficult Menus

This is not a simple program. The menus are complex and bureaucratic, with stark and unforgiving demands for information. Entries are in the form of one- or two-letter choices rather than numbers or any of the function keys. Further, the program demands use of capital letters, an unnecessary stricture for most programs.

The accompanying dot-matrix manual is rather grim, and chock-full of spelling and grammatical errors. (A few make their way to the screen, as well.) I found it perturbing not to have any serious discussion of the theories of nutrition espoused by the program. Instead, you are forced to accept as gospel its criticisms and recommendations.

Diet Monitor includes 758 foods and vitamin supplements with their elements already broken down for charts. The manual does not include a copy of the listing. In order to use the program, you must print out a full listing of the foods with their code numbers.



THE PROGRAM works, but requires a great deal of dedication and patience.

The program also has no provision for adding your own foods. If you live on a diet of rattlesnake meat and dandelions, you might find that you are an unlisted number.

To run the program, fill out a day-to-day tally sheet. You can print out the forms on your printer and opt for either once-a-week or day-by-day analysis. The program does not hold onto your input; instead, you get an instant (and ponderous) analysis. The program does not hold onto data. If you are looking for a monthly or annual analysis or a 7-day analysis that does not correspond to the calendar week calculated earlier, you'll have to reinput the data.

The program works, but requires a great deal of dedication and patience. It is by no means fun to use; but then again, who ever claimed that going on a diet was easy? Still, there must be more elegantly-produced applications than this one.

/PC

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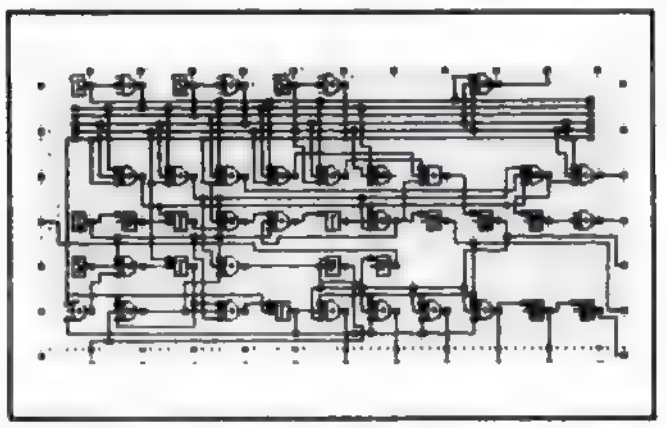
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- Interfaces to General Ledger.
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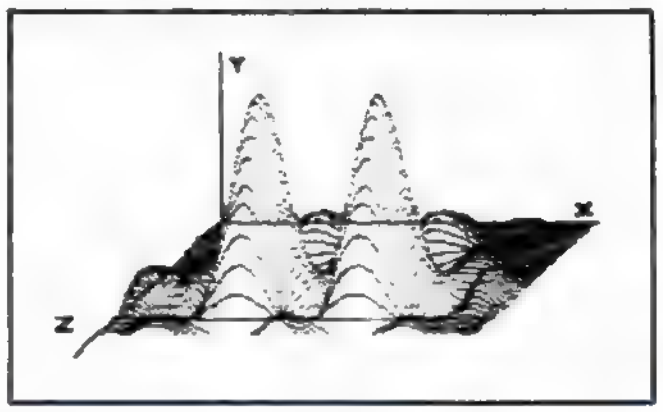
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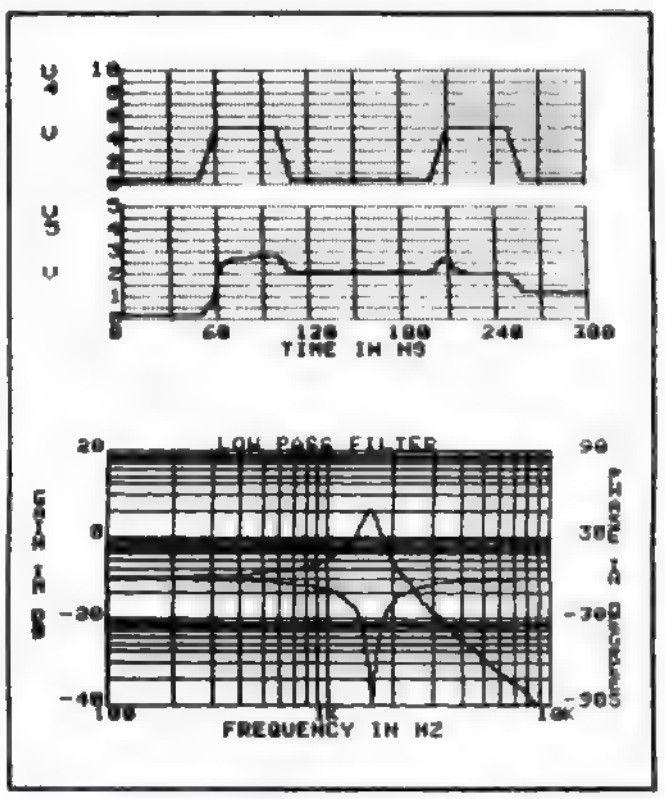


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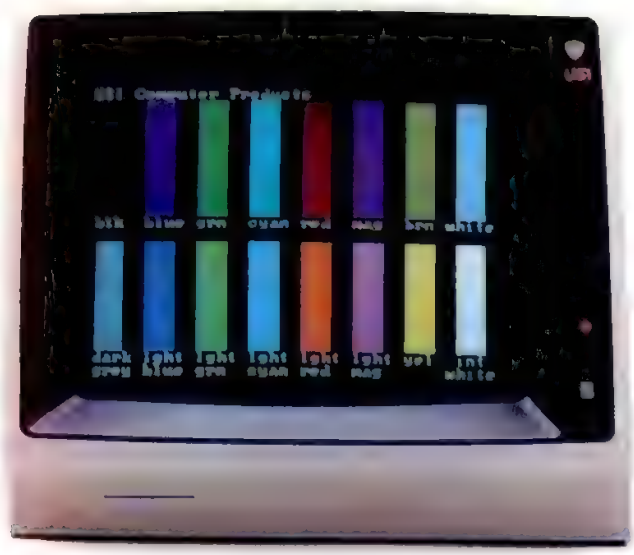
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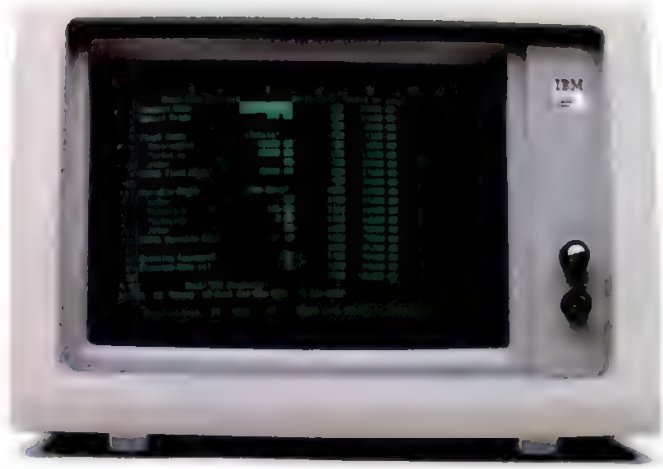
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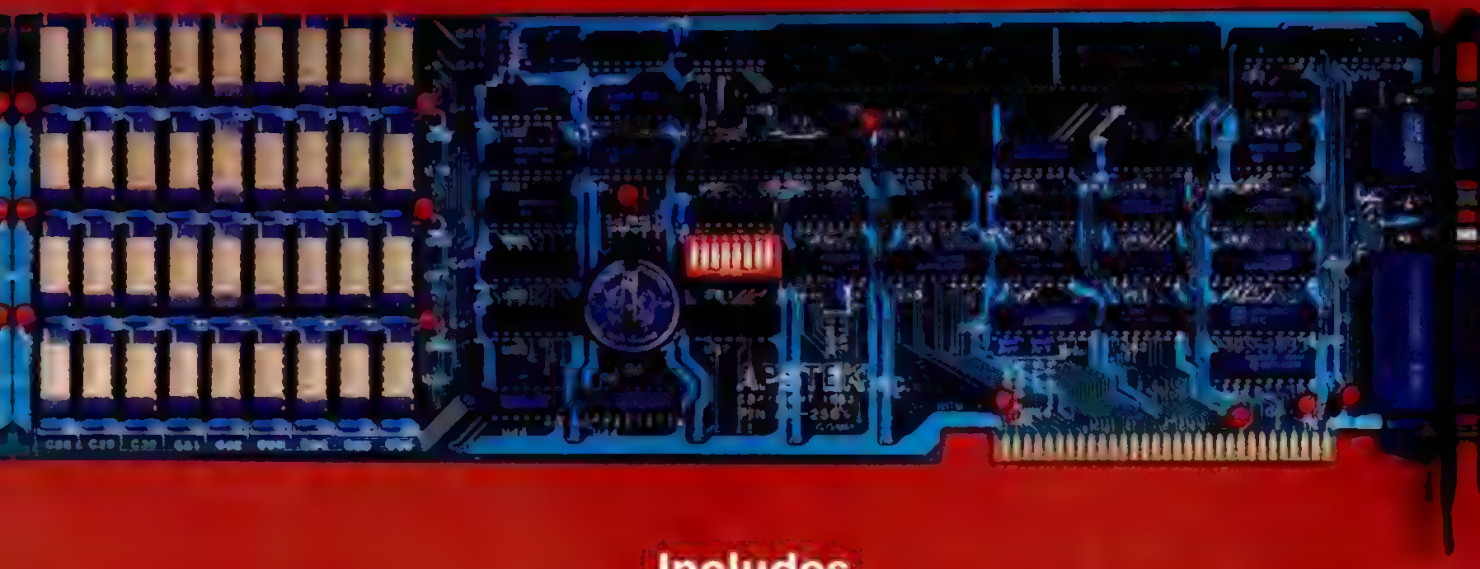
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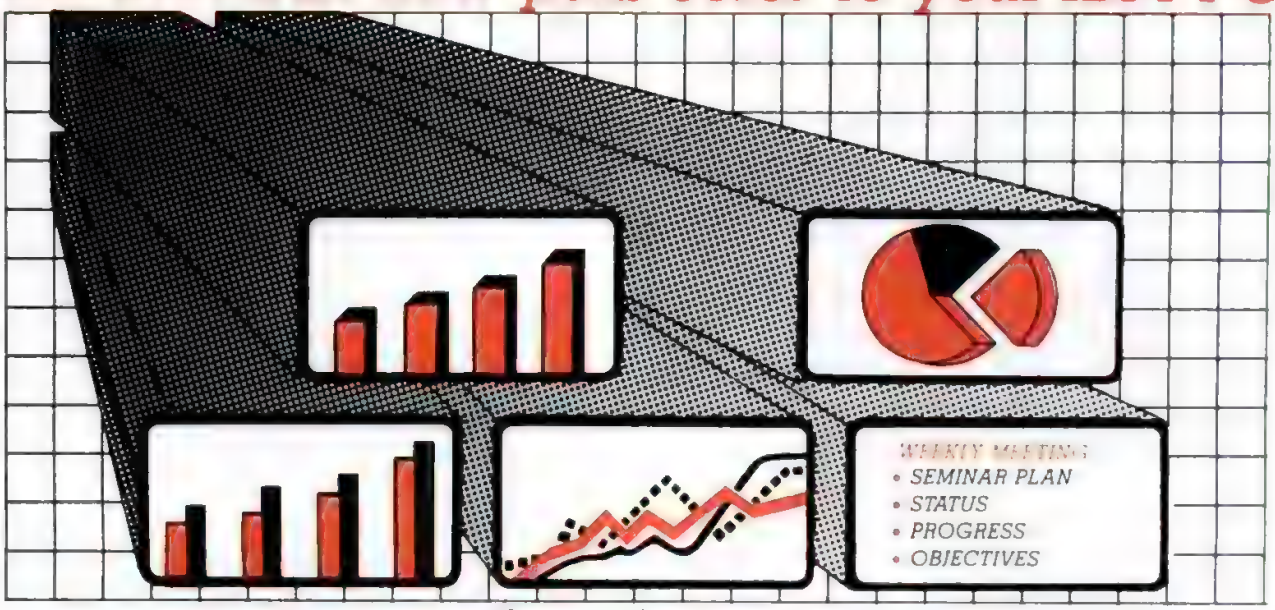
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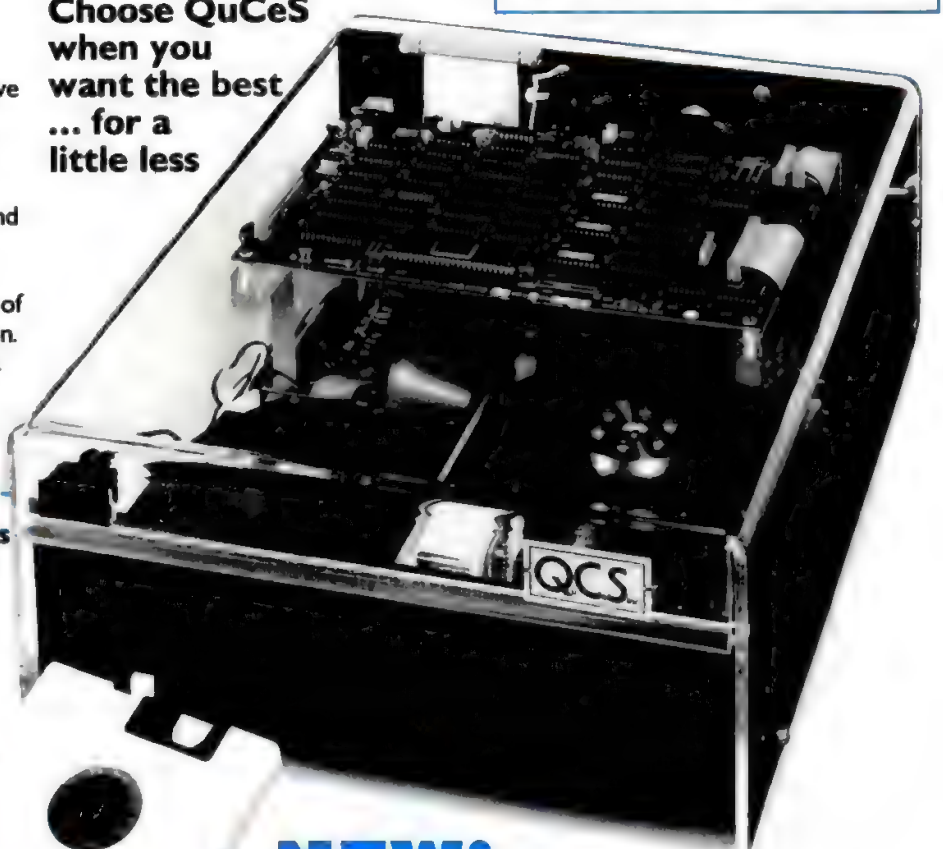
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CIRCLE 492 ON READER SERVICE CARD

This heavy-duty program can handle practically any word processing chore, but among other faults, it lacks the "human touch."



Spellbinder Comes To The PC

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(916) 758-3630
List Price: $495

CIRCLE 700 ON READER SERVICE CARD

I have a very clear notion about how to evaluate word processing software. It's the same notion I have about evaluating any software product, particularly the interactive ones. The first order of business is an assessment of the product's functionality, followed by an attempt to understand how it was engineered. By using the program, I try to get the best possible feeling for its human factors, for how well it relates to its master.

THE TUTORIAL is a source of uneasiness for the IBM PC user.

For me, there are two categories of word processor programs. One I call "world class," meaning that the program provides the feature and function of the dedicated word processing systems; the other category consists of those programs that don't have this capability. *Spellbinder* is a world class word processor, in the same category as *WordStar*, *WordPerfect*, and *MultiMate*. Membership in this select group is perhaps the best measure of a program's capabilities. On the other hand, the very small computer market has reached a point at which more than one generation of software technology is visible. Since *Spellbinder*, like *WordStar*, is a first generation product, this implies an

imperfect but meaningful metric for the engineering of the program.

I found all the embedded commands to be cryptic and complicated.

Documentation

Since the manual is a usual starting point for someone beginning a new program, I concentrated on that first. A large section of the manual is devoted to a tutorial, a good sign for any program. Although there are occasional spelling mistakes, the tutorial is basically well written. It will get the first time user off to a good start, though not enough of the sample text items are available on the disk. The user is forced to type sample text in order to try the particular feature under discussion. This slows the tutorial down, something I found quite frustrating.

The tutorial is also a source of uneasiness for the IBM PC user, since some of the descriptions do not quite match the effects displayed. This is only the tip of a much larger iceberg: the tutorial is dated December 1981 for series 5.1, while the rest of the document is dated August 1982 for version 5.12. The program delivered to me was version 5.20, and from dates on the disk files, appeared to be manufactured in November 1982. I soon discovered that the documentation describes only the generic product for the CP/M environment, supplying only two pages of supplemental information for the IBM DOS environment. In addition, this information does not become useful until the program is better understood.

The problems with the manual are compounded by the lack of an index. Once located, however, the information is complete and the writing is clear and consistent. The manual is also well-organized, with tabs separating the different sections.

Getting Started

Spellbinder loads from disk quickly, displaying its "hello" screen. The very strange message, ![HIT A KEY]!, invites you to hit one of four active function keys, to activate useful functions such as filing, or any other key, to advance to the main

Spellbinder on the PC tries to overcome the command code problem by placing most functions on the function keys.

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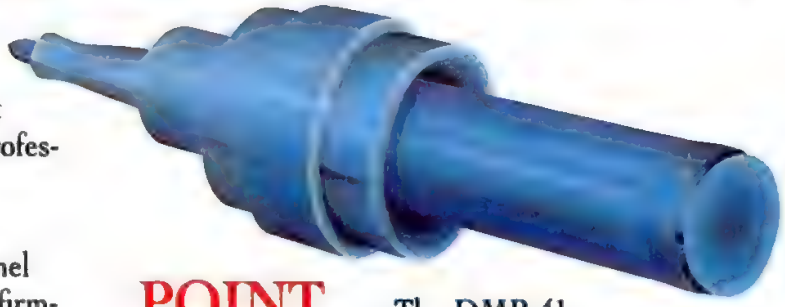
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CIRCLE 243 ON READER SERVICE CARD

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display screen.

The main screen is divided into four sections. The bulk of the display is given to the text area, about 20 lines worth. The bottom of the screen has a "softkey" display, actually a visual menu of the functions available from the PC's 10 function keys. The top line (and sometimes the top two lines) is used as a status and command area. When the word "COMMAND:" appears, the program is ready to accept either typed commands or depressions of active function keys. Errors in command entry are indicated at the far right of the top line. When the word "EDIT" appears, text can be entered or commands of various kinds can be invoked with control characters, escape sequences, or depression of active function keys. The center of the line contains various indicators, such as the line and column number of the current cursor position and the current text mode.

Modes

Spellbinder is very much given to modes of operation. Along with the command/edit mode, it also contains a text mode which allows operation on characters, words, sentences, paragraphs, or marked blocks of text. Text entry is normally a replacement operation, but an insertion mode can be selected. Depending on which modes are active and which commands have been issued, the softkey display takes on different values.

ON THE IBM, it is absolutely necessary to take your eyes from the screen to find the right key.

Since navigation through the program depends on an understanding of the state of the system at any moment, I found the system very difficult to approach and I was very uncomfortable using it. The most difficult problem I had, probably because of my experience with *WordStar* and *WordPerfect*, was that I often tried to type a command when I was in edit mode. Although the program does not have as many command sequences as *WordStar*, I found it more difficult to use because I often hesitated while I tried to determine how to invoke a particular command. Further confusion results because there are sometimes two ways to accomplish the same thing.

A simple example is moving the cursor to the beginning or end of the file. In command mode, the letters "T" and "E" accomplish the function. In edit mode, the same letters preceded by the escape (Esc) key also do it. More complicated is the case of moving to a mark in the text. Edit mode Esc "F" and "B" commands move the cursor forwards and backwards to the next mark. The same letters in command mode work, but other options can be added. I found myself trying to use these options in the edit mode versions, which does not work.

Commands and Keys

Inconsistency within commands did not help either. F moves forward to a mark; FF sends a form feed to the printer; and FY, FT, and FH have to do with text formatting. H or H followed by a number are hold commands, while HE and HEO are help commands. The worst is the G series: G means get text from a file, GD means the edit is done (it stands for "global done," but I couldn't get the word "get" out of my mind whenever I used any form of this command), and GQ means to abandon the edit (global quit). There are other examples.

Spellbinder on the PC tries to overcome this command code problem by placing most functions on the function keys. The idea is not bad, but it takes an unexpected turn. As you strike function keys, the softkey display changes, in effect giving you a new menu. Now this, of course, is exactly what softkey operation is all about, but unfortunately the PC is not really built for it, and products like *Spellbinder* that try to use the feature suffer because of it. The problem is that there is no logical connection between the assigned function key and the operation to be selected. Hewlett-Packard systems, with the keys placed directly below the softkey display on the screen, are the best implementation. On the IBM, it is absolutely necessary to take your eyes from the screen to find the right key: even the position on the screen does not relate to the physical placement of the key.

While it is true that a design shortcoming in the PC is not *Spellbinder*'s fault, I think the programmers should have avoided this temptation in favor of their original CP/M implementation of control key sequences, *à la WordStar*. Although all those sequences are present in the IBM implementation, the menus have given way to the softkey display.

CURSING DID not help, nor could I find a clue in the manual.

The result of all this was that I found myself using letter commands in command mode almost exclusively, because they were at least easier to understand and learn.

Embedded Commands

There are two kinds of commands, most of which relate to printing, that are written into the text of the document.

Dot commands occupy a line of their own. The line begins with a dot (period) and the letter for the specific dot command. In some cases, the command is followed by text. The more common dot commands are .C to center a line of text, .E to force a new page, .H to define the text for headers and footers, and three .Y commands to control formatting.

In-line commands take a variety of forms. The most common are @ to indicate a merge field, # to pass arbitrary codes to the printer, and ! to activate changes in font, line spacing, and enhancement, among others.

In general, I found all the embedded commands to be cryptic and complicated. The worst cases, and the most needed ones, are the two "Y-table" formatting commands. The Y-table has 14 parameters that control most aspects of print formatting. To change from single spacing to double spacing, a .Y command must be included in the text with the sixth parameter set to 2. A typical command might be:

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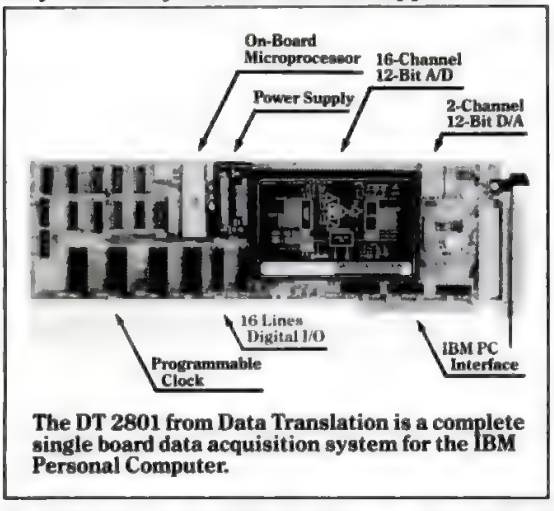
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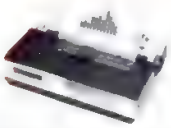
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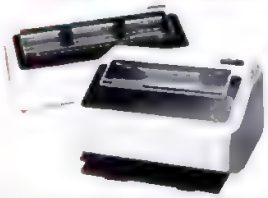
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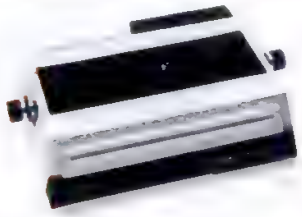


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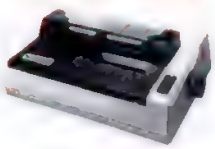


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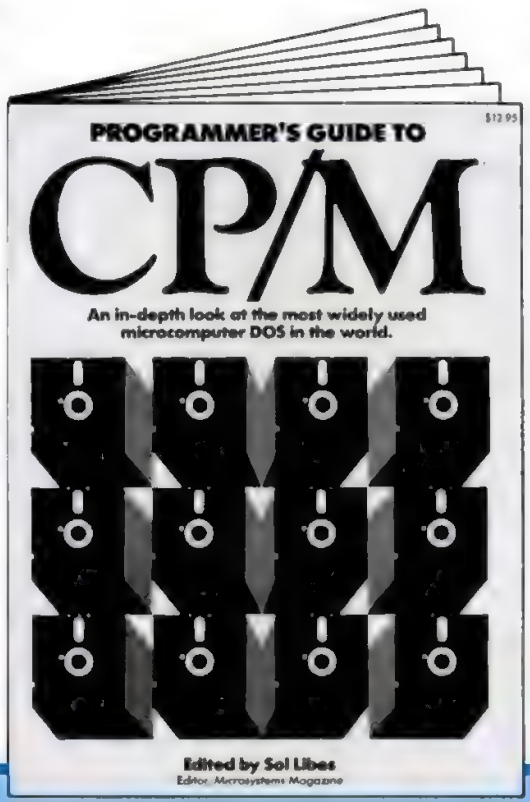
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Spellbinder provides a quick way to enter this table with a single keystroke, and you can then edit it to change whatever part of the file you like. Of course, this assumes you can remember which of the 14 numbers you need to change. The YT-table has only 12 controls for headers, footers, page numbers, and margins. To completely specify margins other than the default, both a Y- and YT-table are required.

I WAS downright angry at three things as I came to know this program.

Spellbinder Speaks

For the most part, *Spellbinder* spoke up when I made errors and tried to guide me along. There are some notable exceptions, and some points of confusion.

The program frequently detects an error of one sort or another and displays a message telling you about it. In these cases, the screen clears and the message is the only thing visible. In fact, there is not even a clue about what your next step should be. This happened to me first when I tried to exit *Spellbinder* without having closed the files. The message appeared to tell me that I had to rectify that situation before I quit. And there it stayed.

Cursing did not help, nor could I find a clue in the manual (no list of errors and again, no index), so I finally did what I always do when I get stuck: I started hitting keys, Enter first. That worked, and got me back to the main display. There is just no excuse for that kind of program behavior.

The placement of the command and status area at the top of the screen seems okay, until the discovery that some status or information messages are displayed at the bottom. It happens to be hard to see this happen, since the messages are emitted in reverse video, the same as the softkey display. In fact, it is sometimes hard to know that *Spellbinder* is talking to you because only some messages include a beep to alert you.

Irritations

I was downright angry at three things as I came to know this program. First, I was never able to figure out how to get *Spellbinder* to accept a different printer as its default. My home system has the IBM printer; I do not own a letter-quality machine, called a "precision printer" in the *Spellbinder* documentation. The initial configuration session asks whether or not you have a precision printer and if so, what type, but the printer format table is always set for a precision printer when the program begins execution.

Second, tab settings are not retained with the document. From a *Spellbinder* perspective, this is not required because the program does not actually store tab characters in the text. When the tab key is used the necessary number of spaces are placed in the text. However, this means that the tab settings for complicated tables or differing sections of the same document have to be set manually as required.

Third, and this one may be a little picky, the exit command X did not, and at the same time gave no indication of why it would not. It develops that the X command and depressing the softkey labelled "Exit" are not the same. The function key invokes a macro that checks the condition of the system and at least tells you why it will not exit when you have so commanded. A failing X command returns you to edit mode with no explanation. Using the exit key gave me the clue I needed: files were open, and X won't work in that case.

THE MACRO feature of Spellbinder is probably its strongest selling point.

Macros

The macro feature of *Spellbinder* is probably its strongest selling point. The feature is actually a little programming

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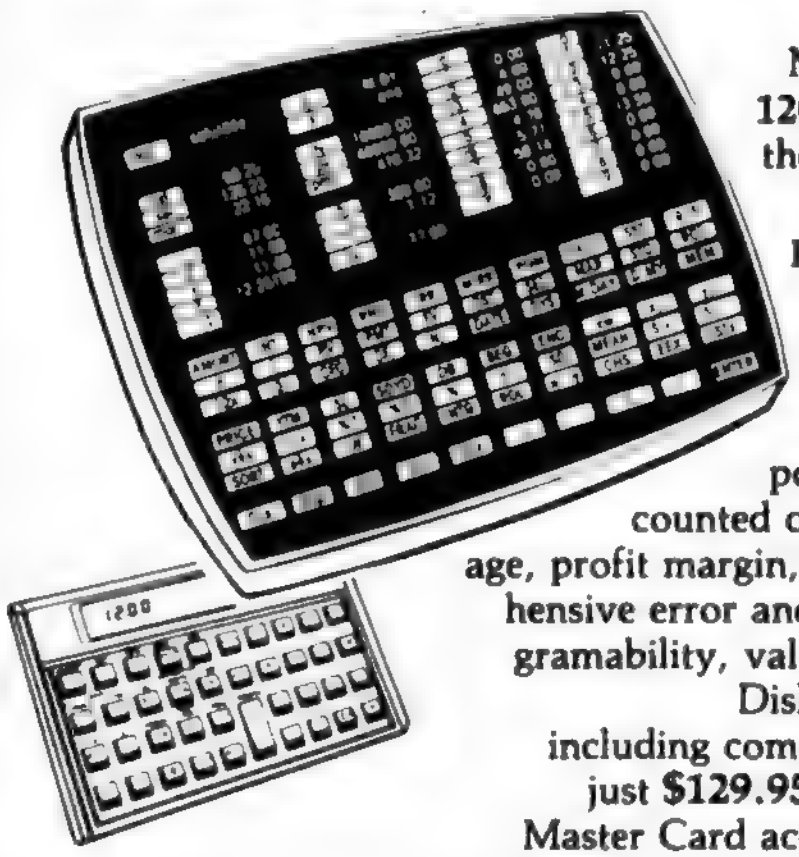
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language called "M-Speak," which allows *Spellbinder* to be extended to include new functions and features. In fact, Lexisoft has used the facility to provide a number of features as standard parts of the system. These include two column printing, sorting, mail merge, column editing, key phrases, forms generation and fill-in, automatic boilerplate operation, and math functions.

SPELLBINDER falls a bit short, and could use significant improvement.

M-Speak is so powerful that I think *Spellbinder* itself could be implemented with it. But as powerful as this capability is, it is a little over the head of the average user. It is not much more difficult than BASIC, but it is more cryptic.

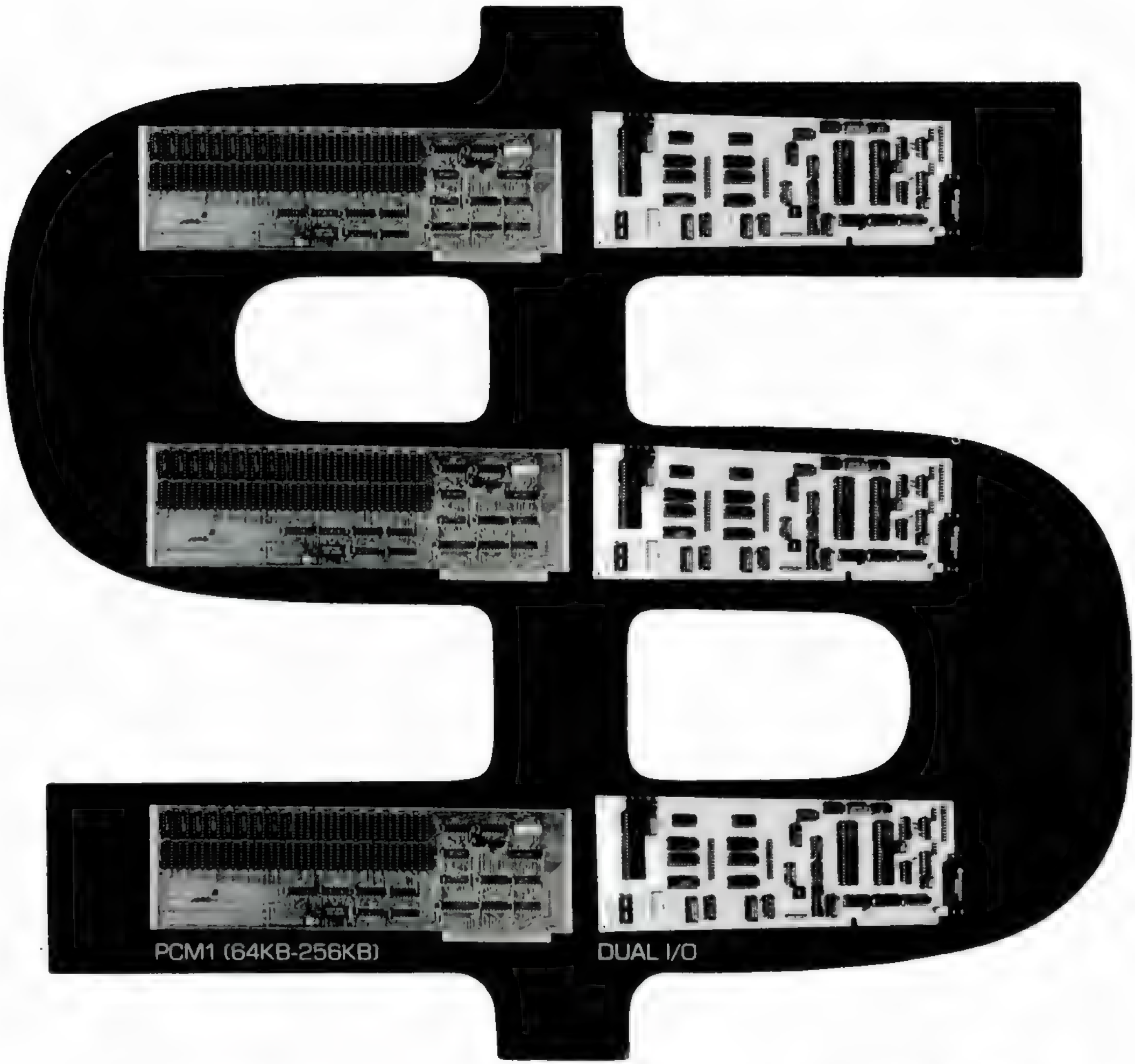
Printers

Spellbinder offers good support for printers. A number of popular "precision" printers are supported and the program has the flexibility to get the most out of them.

The most interesting feature of *Spellbinder* is the space table. This is a table which defines the spacing to be used for each character in a proportionally spaced character set. The table is easy to edit (by *Spellbinder*, of course) and equally easy to use. The document describes this as an out for the user who does not care for the choice made by Lexisoft.

Summary

For all the problems I have cited, *Spellbinder* does have the capability to handle just about any word processing chore. Using M-Speak to write programs, it can be enhanced or customized to your specific needs. The interaction between it and user, the human interface, is the weak point. Given enough time and practice, of course, you can learn to overcome this problem. For general use, however, I would have to say that *Spellbinder* falls a bit short, and could use significant improvement. */PC*



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Without software, a computer can't do anything.

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You have to buy both.

Buy the software first.

Since the reason you're buying a computer is to get the capability the software gives you (remember, it's the software that knows how to get things done), it makes good sense to pick the software first.

Start by making a list of the things you want to use the computer for. It can include almost anything—any kind of inventory, filing, accounting, graphics, reporting, record-keeping, analysis—you name it and there's probably a software program that does it.

Next, take the list into a computer store and ask the salesperson to give you a demonstration of the program, or programs, that will do the things you want.

Even though you'll need a computer for the software demonstration, keep in mind the computer is just a vehicle. The software is the driver. And once you've decided on the software, picking out the rest of the computer system will be much easier.

The simpler the better.

Look for software that's easy to learn, easy to use, and that does the job in the simplest way possible.



Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you have to do without getting in the way.

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Some people, however, will tell you that software has to be complicated to be powerful.

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Because in order for a program to appear simple to you on the outside, it has to be extremely complex on the inside.

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You simply have to see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask friends who have them. You can look at all the sales literature you can get your hands on. And you should do all those things before you decide to buy.

But as helpful as all that can be, there really is no substitute for a real, live demonstration.

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How would you like to have your PC greet you with a sunny "Good Morning" every time you turned it on? Or ask you in your own voice to enter the data you need to process? Or even better, add dramatic sound effects to your homemade programs? And do all this at a price so low you'll think it's a typographical error?

Dragon Data Systems, a Vancouver, British Columbia software company whose motto is "We bring out the beast in your computer," has just released a sizzling piece of software it calls *PC Parrot*. The program works by digitizing words and sounds that you enter through an ordinary tape recorder that plugs into the little-used cassette port of the PC. It translates each 1.5 seconds into a character string that you can convert back into fairly recognizable sounds with a simple utility supplied.

Company President Anatoliy T. Chumak readily admits that his software is neither a substitute for onscreen text messages or the equivalent of an expensive hardware synthesizer. "Some words



Illustration: Bob Conrad



come out well, others as can be expected with one bit of vertical resolution. But it does open up some new frontiers. Our most satisfied users are those who find it a terrific enhancement tool for their BASIC programming." The tinny transistor radio quality speaker in the PC doesn't help much.

The magical thing about PC *Parrot* is that it will reproduce sounds in an approximation of your own voice rather than in the flat, nasal robot tone favored by many hardware devices. And you can use it to create fairly authentic sound effects to accompany graphics on the screen. For instance, if you're writing a maze game, you can incorporate the sound of heels slapping down a hallway. Or illustrate a crash with a realistic crunch of metal, taken from a sound effects record. Or add assorted screeches and animal noises to signal wrong turns.

Chumak hopes that purchasers will experiment, and compile libraries of their most lifelike or interesting sounds that they could swap with other *Parrot* programmers. He thinks PC user groups would be ideal for this.

PC PARROT will reproduce sounds in your own voice.

Showing Off

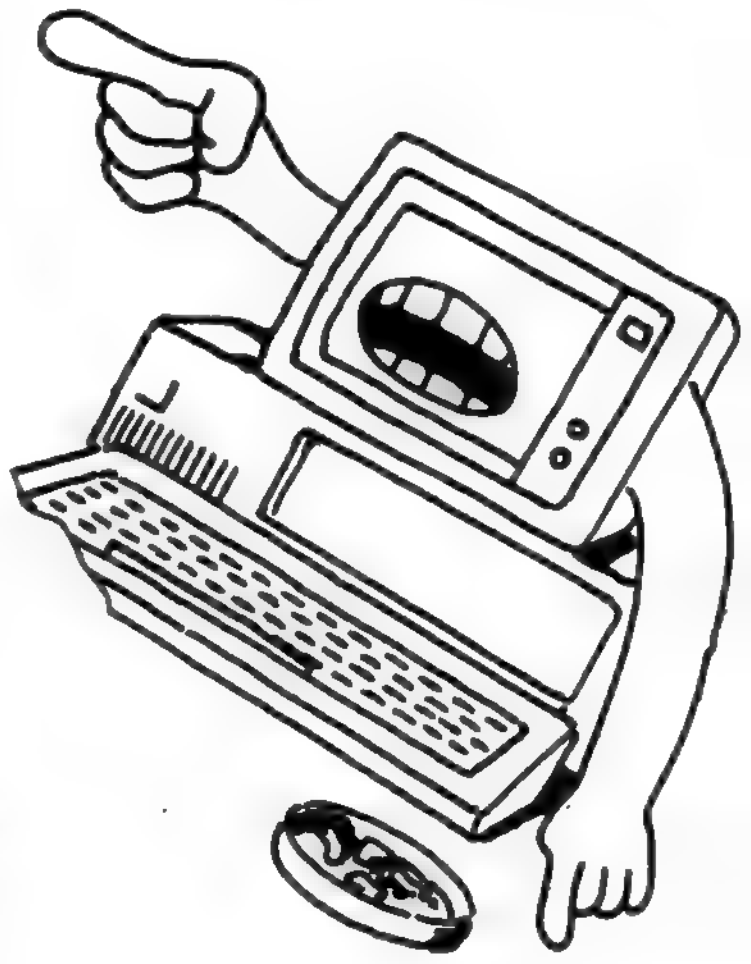
One application that should become immensely popular is demonstrating your PC to curious friends who stare at it and ask, "Well, what can it do?" Since the PC speaker is hidden, it looks almost as if the microprocessor has somehow sprouted a larynx. The effect is somewhat magical.

Using the program is fairly simple once you get the hang of it. If you want to create your own sounds, it allows you to play them back as you record them so you can make changes in volume and tone. And it makes naming each sound easy, although you have to keep track of what sounds you've already recorded so you don't write over an old one by saving a new one with the same name.

THERE are some nice touches and some sloppy ones.

The disk comes with three vocabulary files containing nearly a hundred already-recorded words and syllables, including the letters of the alphabet and a dozen or so digits. However, the cryptic single sheet of instructions doesn't provide much guidance on playing these back.

To hear these prerecorded sounds, you must merge at least two files from the disk. The easiest way to do this is to go into BASICA, load "SAY.TXT" (the one-



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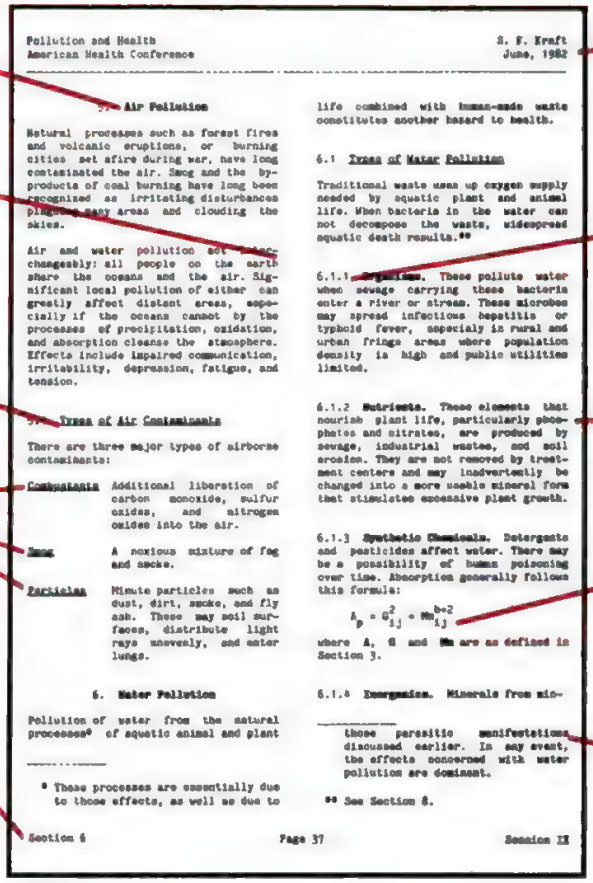
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Pollution and Health — S. F. Kraft
American Health Conference — June, 1982

5. Air Pollution

Natural processes such as forest fires and volcanic eruptions, or burning cities set afire during war, have long contaminated the air. Smog and the by-products of coal burning have long been recognized as irritating disturbances plaguing many areas and clouding the skies.

Air and water pollution set [illegible] changeably: all people on the earth share the oceans and the air. Significant local pollution of either can greatly affect distant areas, especially if the oceans cannot by the processes of precipitation, oxidation, and absorption cleanse the atmosphere. Effects include impaired communication, irritability, depression, fatigue, and tension.

5.1 Types of Air Contaminants

There are three major types of airborne contaminants:

Combustants — Additional liberation of carbon monoxide, sulfur oxides, and nitrogen oxides into the air.

Smog — A noxious mixture of fog and smoke.

Particles — Minute particles such as dust, dirt, smoke, and fly ash. These may soil surfaces, distribute light rays unevenly, and enter lungs.

6. Water Pollution

Pollution of water from the natural processes* of aquatic animal and plant life combined with human-made waste constitutes another hazard to health.

6.1 Types of Water Pollution

Traditional waste uses up oxygen supply needed by aquatic plant and animal life. When bacteria in the water can not decompose the waste, widespread aquatic death results.**

6.1.1 Organisms. These pollute water when sewage carrying these bacteria enter a river or stream. These microbes may spread infectious hepatitis or typhoid fever, especially in rural and urban fringe areas where population density is high and public utilities limited.

6.1.2 Nutrients. These elements that nourish plant life, particularly phosphates and nitrates, are produced by sewage, industrial wastes, and soil erosion. They are not removed by treatment centers and may inadvertently be changed into a more usable mineral form that stimulates excessive plant growth.

6.1.3 Synthetic Chemicals. Detergents and pesticides affect water. There may be a possibility of human poisoning over time. Absorption generally follows this formula:

$$A_p = G^2_{ij} \cdot m^{b+2}_{ij}$$

where A, G and m are as defined in Section 3.

6.1.4 Inorganics. Minerals from mi-

those parasitic manifestations discussed earlier. In any event, the effects concerned with water pollution are dominant.

* These processes are essentially due to those effects, as well as due to

** See Section 8.

Section 6 — Page 37 — Session IX

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line utility that plays back the sounds), then merge one of the three word files (named VOCAB-01.ASC, VOCAB-02.ASC, and VOCAB-03.ASC) from the disk into it. Finally, to hear it say "eleven," enter a line of BASIC that says: 5000 CALL SAY(ELEVEN$). Substitute the names of other strings inside the parentheses to hear other sounds. You can get

THIS prevents PC Parrot from starting off every sound with the distinctive IBM keyboard click.

an onscreen list of all the prerecorded sounds on the disk by going into DOS, typing TYPE plus the full name of one of the three VOCAB files, then hitting Enter.

You can also manipulate the strings by playing and saving parts of them to create a sort of crude phoneme alphabet. This allows you to create some very bizarre noises, but takes quite a bit of trial and error programming.

Nasty Habits

The program has a nasty habit of hanging if you tell it to call a string that is not on the disk. And if you try to merge two vocabulary files, you must remember to renumber the old one before you merge the new one or they'll both try to fill the same space.

The documentation speaks of an "extensive vocabulary" of "numeric digits, alphabet, business, scientific and of course recreational oriented words." Unless several files were left off the disk I was using, the only available words other than numbers and letters are "count, say, what, ever, want, me, and, easy, now, do, you, think, of, that, up, down, page, home, end" as well as "uze, rigt," and "lft." I guess their definition of business and recreation is different from mine.

There are three demo programs on the disk. One loops through three or four sentences droning out an introduction while

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printed versions of the spoken words drift across the screen like ticker tape. This makes a good point; by themselves many of the sounds are hard to recognize. But when they accompany onscreen text—especially when one or two words at a time appear on your monitor—the sounds suddenly seem clearer.

Another demo program, called "DIGITS," simply flashes the numbers from 0 to 9 on your screen while pronouncing them. This actually has an application. You can get into the BASIC program that makes it work, and change it slightly by making the FOR-NEXT loop step lower instead of higher, and then delete the very last line. What you'll end up with is a missile-launch countdown suitable for inserting at the beginning of a program to get the viewer's attention.

The remaining demo, "NUMBERS," allows you to input any number and hear the PC pronounce it. This works fairly well, except that Dragon Data could have made the display more attractive—the "ENTER A NUMBER" messages simply scroll down the left edge of the screen. And while the program is smart enough to precede a negative number with a "mi. . .nus. . .," it threw in an extra million and a syntax error every time. *PC Parrot* handles positive numbers with ease, even croaking out "this. . .num. . .ber. . . is. . .out. . .of. . .range" if you enter an integer the PC can't comprehend. It tosses off decimal points with the flair of a Hollywood agent, but stumbles hopelessly over commas.

IT THREW in an extra million and a syntax error every time.

The real advantage of these demos, aside from their parlor magic qualities, is that you can take them apart and see how they work. This provides many shortcuts to creating your own successful programs.

There are some nice touches in the package and some sloppy ones. Many sounds will take up the full 1.5 seconds alloted. But if you record a short sound, it will truncate the "dead air time." This is useful if you're stringing sounds together and don't want lots of awkward pauses in each phrase. Another clever feature is that the recording mechanism is sound-activated, allowing you to gather your wits before you blurt out a syllable. And after you hit a key to start the recording process, the program even disables itself automatically for one second. This prevents *PC Parrot* from starting off every sound with the distinctive IBM keyboard click. But several times, various activities ground to a halt when the program encounters small syntax errors.

IT HAS some rough edges, and will appeal primarily to PC owners who like to fiddle with BASIC.

Ads for *Parrot* crow that no extra hardware is needed. This is generally true; you don't have to purchase a costly synthesizer, speaker, or amplifier since versions of these already exist in the PC. But you do need an inexpensive cable to connect your tape recorder or microphone amplifier to the back of the computer.

Dragon Data's other products include a serviceable version of *Breakout* that it calls *Block Buster* that works well on the monochrome screen. In fact it has a very fast, responsive keyboard-driven paddle, if you like bouncing blips off other blips. And the company is starting to release a small stable of powerful, extremely low-cost utilities.

But it will probably be *PC Parrot* that puts the company on the map. The program isn't for everybody. It has some rough edges, and will appeal primarily to PC users who like to fiddle with BASIC or show off their computers to friends. It makes ingenious use of the PC innards, and draws crowds every time. But it's no Votrax. Although *PC Parrot* lists for $39.95, it is currently available for the introductory sum of $24.95. At that price it might just fly off the shelves. */PC*

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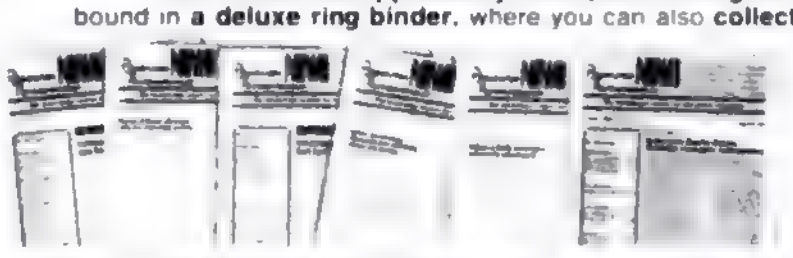
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PART TWO of the manual is **loaded** with the **know-how** and **"streetfighting" savvy** you need both as a **novice** or business **veteran**, to get started to stay and to **prosper** in the micro computer business! **A goldmine of information** in clear and easy-to-use instructions How to prepare your **Business Plan. Outside financing**, The **mistakes** you **must avoid**, How to **hire** and **manage employees, Incorporation** (when and how to do it **cheaply**). **Surviving bad times, Record Keeping**, how to **estimate your market before you start**, Use **multiple locations** to **maximize profits**, how to **promote** and **stay** steps **ahead of the competition!** How to get **free advertising, free merchandise, free advice, Power negotiating** with suppliers to **double** your **profit margins, etc!** Even how to **keep a present job while starting a business part time!**

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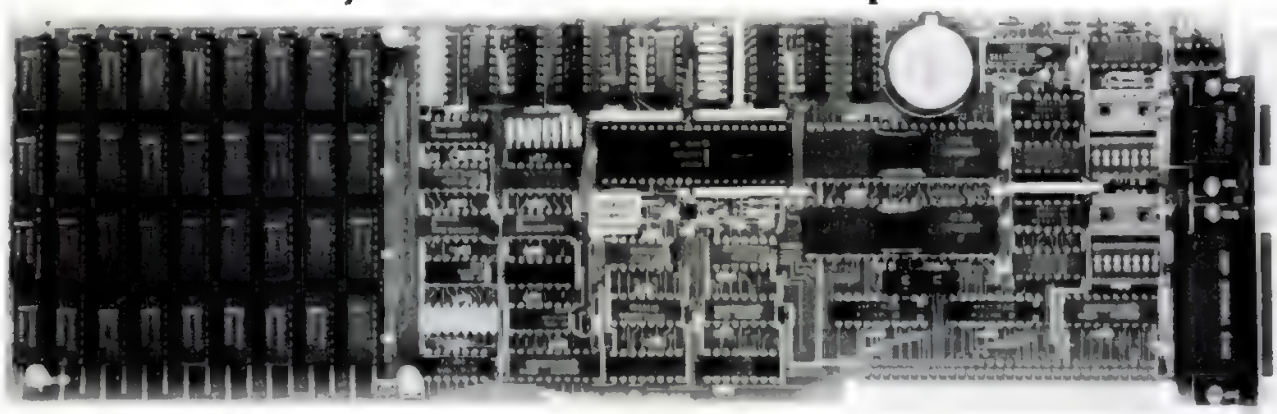
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PC0383

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PDI464

Pure Data presents the unparalleled combination board for your IBM® Personal Computer.



The PDI464 features six separate functions — expansion memory, two asynchronous serial channels, a real-time clock, a disk emulator, and a print spooler. Together with its high quality, the PDI464 offers a price-performance ratio that is tough to beat.

The memory section of the PDI464 provides up to 256KB of fully socketed expansion memory with parity generation and checking. Four memory sizes are available from 64 up to 256KB to meet a variety of needs. Regardless of memory size ordered, each PDI464 is tested with a full compliment of 256KB of memory to ensure trouble-free future expansion. Disk-based memory diagnostics are included which can test memory integrity and report problems down to the chip level.

Two asynchronous serial channels are provided which are completely compatible with IBM serial channels. Each channel can be selected to reside at one of four addresses to allow for future expansion. A unique feature is provided which allows simple selection of data terminal or data communication equipment [DTE/DCE] configurations, thus eliminating the need for special cables or null modems. Each channel comes complete with a 6 foot RS-232 cable.

The Real-Time Clock section features quartz-crystal control and lithium battery back-up to ensure years of trouble-free operation. The RTC features hours, minutes, seconds, day-of-the-week, date, month, and year with automatic leap year adjustment. Software is provided to initialize system time and date information automatically upon power-up.

p-Disk™, a disk-emulation package provided with the PDI464 allows memory to be treated as an ultra-fast disk drive. p-Disk™ can be configured as a single or double-sided drive and can appear as drive B, C, or D. p-Disk™ does not require modification or patching of the BIOS or DOS files on system diskettes and is fully compatible with IBM software and diagnostics.

A background printer spooler is included with the PDI464 which allows files to be printed on a printer while other software is being used in the foreground. The spooler offers features such as menu-selectable configuration, multiple copies, and upper case options.

Comprehensive documentation is provided with numerous illustrations to simplify installation procedures. All documentation fits neatly into existing 3-ring binders provided with the Personal Computer.

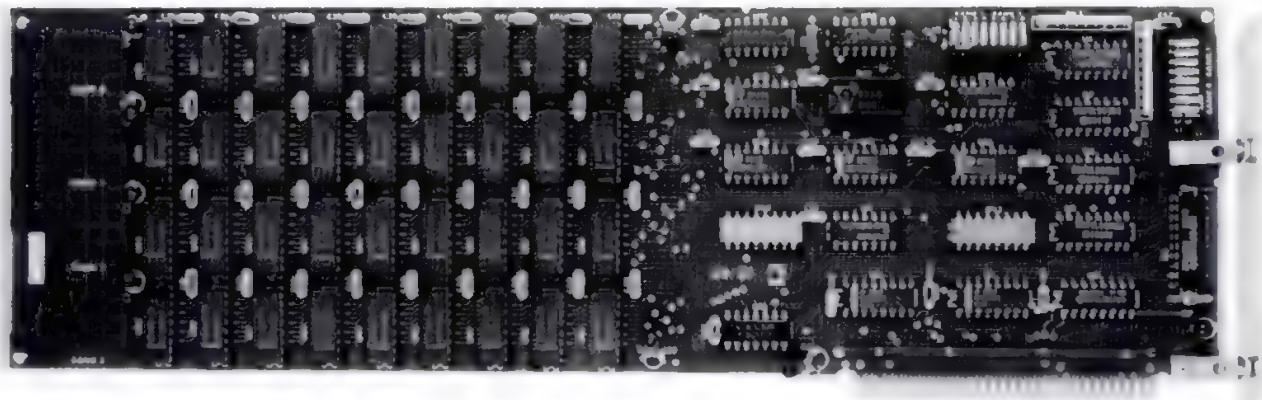
Each PDI464 is "burnt-in" at elevated temperatures and fully tested. Packaging material provides protection from static and mechanical shock during shipment to further ensure reliability. The PDI464 is covered by a one year limited warranty.

p-Disk™ is a trademark of Pure Data Ltd.

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PDI256

256KB Expansion Memory for your IBM Personal Computer.



- ☐ Configured as 4 banks of 64K bytes each
- ☐ Each 64K bank is individually addressable and locatable on 64K byte boundaries
- ☐ On-board parity generation and checking
- ☐ Refresh is synchronized with Planar Memory insuring present and future compatibility
- ☐ Full speed, no wait-states
- ☐ Intel 200 ns ceramic DRams are used throughout
- ☐ Active delay line incorporated for precise refresh
- ☐ Comprehensive installation and operation manual provided
- ☐ Source listing for exhaustive memory testing included
- ☐ Extensive dynamic testing during burn-in. Available in: 64KB [PDI 256-64];128KB [PDI 256-28]; 192KB [PDI 256-92]; 256KB [PDI 256-56]
- ☐ Field expandable up to 256K bytes
- ☐ Guaranteed for 1 full year, same-day service
- ☐ Nickel-plated bracket and card guide included

The PDI 256 provides up to 256KB of user memory with parity on a single expansion board for the IBM Personal Computer. Memory is organized as 4-64KB memory banks, each bank can be set to any 64K boundary within the 1 MB address space. Individual memory banks may also be deselected. All address mappings are made by DIP switch settings for easy configuration. All RAM chips are socketed to allow for easy memory add-on or replacement. Memory refresh for PDI series memory boards coincides with the planar board's refresh. No wait-states are required for expansion memory accesses. The PDI 256 is also available in 64, 128 and 192KB versions which are easily upgraded in 64K steps to a maximum capacity of 256KB.

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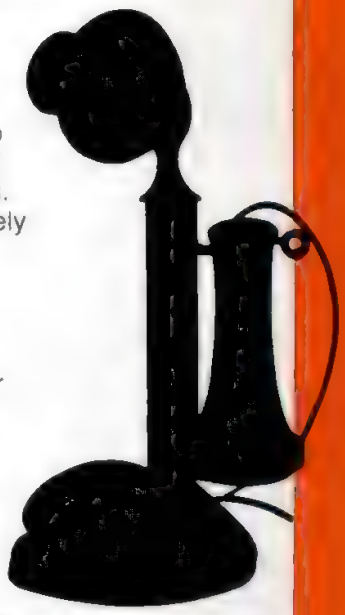
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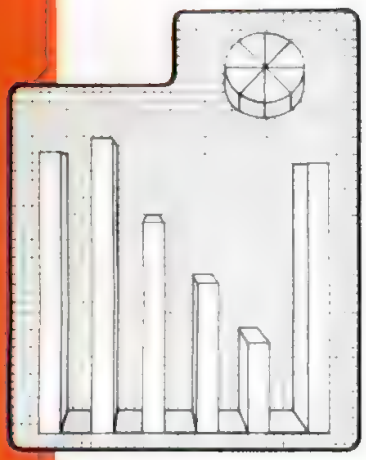
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VideoLink 88 is a comprehensive communications package designed to turn your IBM Personal Computer into an intelligent terminal capable of acquiring and recording information from most other computer systems. This program offers full-featured communications support in a completely menu-driven, easy to use package.

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There's no question that databases are useful tools for storing and retrieving information. Thousands of professionals use databases to monitor inventory, manage mail lists, record fixed assets, and keep track of personnel records.

So what's the problem?

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In hundreds of personal computer applications, users agree on one thing: there's nothing more aggravating than a database that lacks all the features to do the job that needs to get done.

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Why is that so important? Because experienced users know how many aggravating hours they can waste fixing mistakes that their database should have caught.

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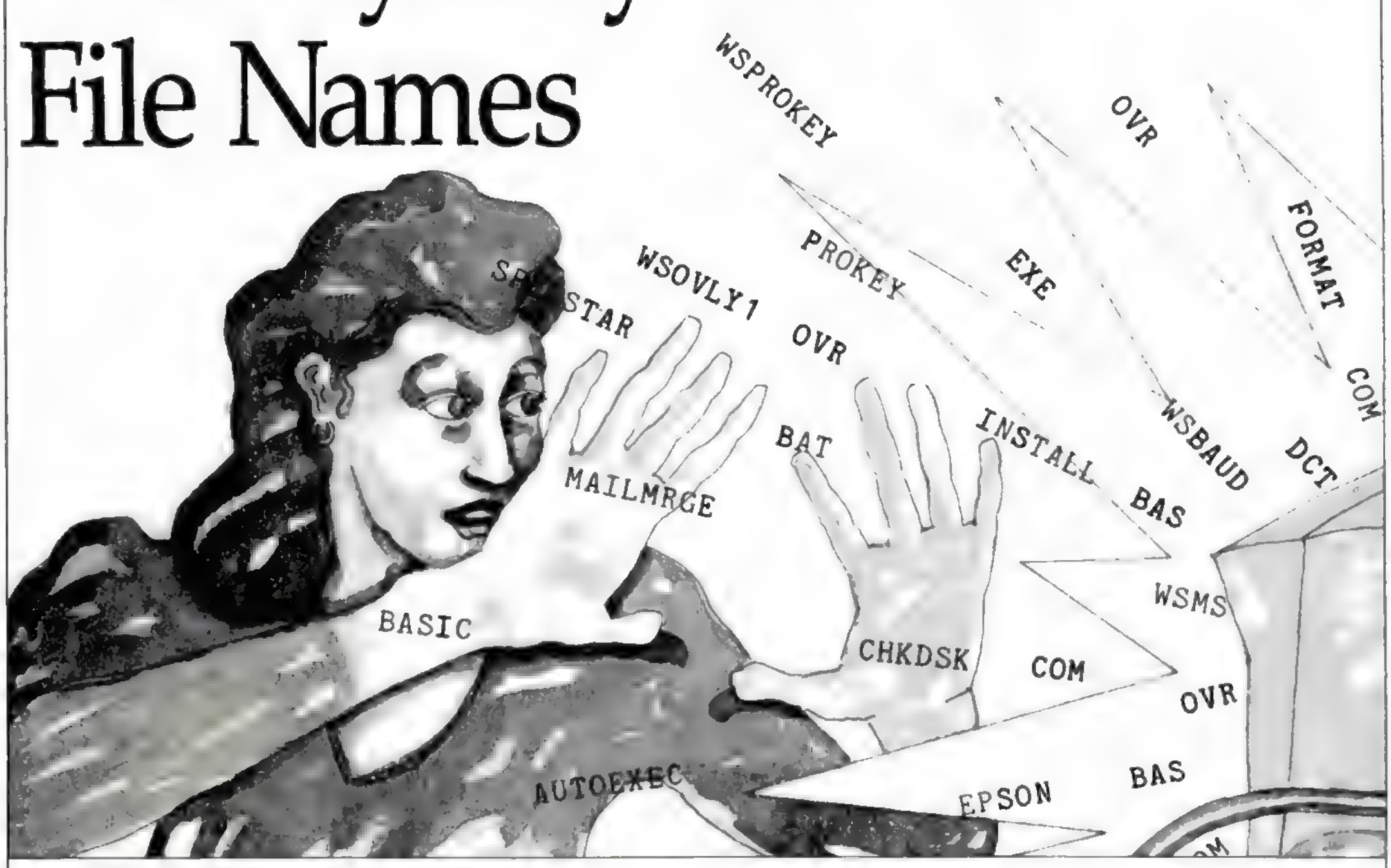
Personal Database/ Reports

For Use With IBM PC and APPLE II

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If, like most PC users, you are often frustrated and confused by the limitations of DOS file names, you'll be glad to know about this handy utility.

SimpliFile Takes The Mystery Out Of File Names



SimpliFile
Durant Software
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Berkeley, CA 94704
(415) 540-0912
List Price: $100

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Welcome to the world of electronic filing. Whether you've filled up half a disk, ten disks, or a megabyte of hard disk space, you know that those cryptic "eight plus three" character identities for files can become as inscrutable as a sphinx. If there have been perplexing moments that made you long for the days of the metal file cabinet, don't despair. Help is on the way.

A program called Simplifile makes it easier than ever to manage files on your computer. You can instantly locate a specific file in a long list of weirdly named files, then view its contents immediately with the stroke of a key.

Identify Files and Then Some

With *SimpliFile*, maintaining, identifying and recalling files becomes almost effortless. Why? Because you can describe each file with a typed line of up to 42 characters. Think of it as putting a cap-

Illustration: Michael Donato

FOR IMMEDIATE RELEASE

(Austin, Texas, January, 1983) FYI, Inc. announces new additions to its family of easy-to-use software for the IBM-PC.

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The ultimate productivity system. Designed for professionals and business people that desire state-of-the-art software technology. **FYI5000** offers word processing, instant filing of information in appropriate data bases, search and retrieval based on the user's key word identifiers, and mailing list capabilities such as sorting alphabetically or by zip. **FYI5000** quickly updates entries, prints letters and labels, merges files, splits files and more. **FYI5000** is a total package that creates, files, key word searches, selects, merges and prints information from thousands of free-form entries per data base. Many IBM-PC users will need no other software. **FYI5000** includes all the features of **FYI2000/SUPERFILE** and **POST HASTE. FYI5000** is available for under $500.

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An easy-to-use mailing program that works with standard word processor files, **FYI2000/SUPERFILE** entries and Mail Merge * files. Designed for owners of **FYI2000/SUPERFILE** that would like to sort and print mailing labels, lists, envelopes and more. **POST HASTE** is available for under $100.

All FYI, Inc. software is designed for both beginning and experienced computer users. No programming is ever required. No lengthy "set up" time. No "fields" to identify. No "forms" to create. All systems are menu driven to make them extremely easy to use. All software is **SATISFACTION GUARANTEED.**

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NUMBER THREE

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Now it's easy to search out, check out and change any sector on a Winchester or floppy. EDITDISK displays contents in hexadecimal or ASCII. You'll be so glad you have it.

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Now large EXE program files load *at least* 50% faster or your money back. Enhance all your programs with this guaranteed money saver. The time you save will be well worth it

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tion under a photo. You can also peek into that file before you decide what you want to do with it. The program cuts through the procedures and jargon of DOS utilities so you can copy, back up, erase, rename and date files.

Can you envision what this might do for your specific applications? A physician might mark a file for a specific ailment or necessary update. A cook could identify recipes. A salesperson might note future followups to a customer. An inventory file could be identified with the product being stored. The uses are limited only by your own ingenuity.

Consider a usual file title of eight characters followed by a period and three more characters (DJONESEX.LET). What happens when you look at that two months after you wrote it? It's anyone's guess. Now imagine if, when you call up a list of all the files on your disk, each file had a revealing identity (see Figure 1).

Now, instead of trying to figure out what the file name means, you can read a short description of the file and have the date handy as well. But beyond identity—perhaps you forgot the color or number of the fabric. Type a V in front of the filename and the actual correspondence replaces the Simplifile listing! You can instantly read that letter or the billing. You can scroll it as slowly as you like, or take a quick peek, put it back in its place with a touch of the Escape key, and then return to *SimpliFile*.

If Simplifile did only this, it would be well worth its $100 price tag. But it does much, much more to take the toil out of file management. It works smoothly (almost transparently when you're used to it) whether you have a single disk drive with a small capacity, double drive with large capacity, or a hard disk.

The Disk Area Simplifies Life

SimpliFile is installed on the disk as two command files: SF.BAT and SFX.EXE. Turn on the computer, invoke SF at the A> prompt and the Simplifile logo appears only long enough to load the program and find the files. When this is completed your screen takes on an organization (see Figure 2).

MAINTAINING, identifying and recalling files becomes almost effortless.

The top portion above the horizontal lines is the Disk Area. The bottom portion is the File Area. An easy trip through the manual explains what the words mean and how to use them. All cursor movements involve either the escape, return, or arrow keys; you type only your own descriptions.

When the program appears, the cursor is on the date in the Disk Area and a disk message asks if you want to change it. The cursor then jumps down to the files. Using either the return key or arrow keys

Figure 1: Example of two files listed by SimpliFile.

```
=> DJONESEX.LET | 3K | 013083 | Doris Jones sent example chair fabric
   DJONESAC.BIL | 1K | 021883 | Accepted. Billed. Rebill 031583
```

Figure 2: Screen organization of the SimpliFile program.

```
 * SIMPLIFILE *    | Sort   Mult        | Current:A Backup:B Date: 012583
Space Left: 128K    Exit   FLst                              DiskID: -1LETR
Row:   3 of   25 |              Help    | (Disk message area----------)
-----------------+-----------------+-------------------------------------
CMD  Name   Typ    | Size :Chgdte      : Description
-----------------+-----+-------------+-------------------------------------
     --11tr  DID   | 2K   .012583      : Simplifile identification no
     GENLMOT MCD   : 5K   :120782      : Complaint car Mcdonald/Pres.GM
  => MCGRATH1 LET  : 3K   :121082      : Bid on artwork/ad campaign
     MCGRATH2 LET  : 2K   :010983      : FOLLOW UP-additional info sent
   etc.
```

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you can quickly scan the list, place the cursor in front of the selected file, and hit the key necessary to perform the desired commands.

Other vital information is offered in the disk area. The left portion explains the number of bytes remaining on the disk. "Row" indicates the position of the cursor in the file list and the total number of files on that disk. (Would you ever know how many folders you had in a file drawer?)

AN EASY trip through the manual explains what the words mean and how to use them.

The words and abbreviations in the central panel do not remain mysterious for long. Place your cursor in front of >Sort and a short listing appears in the message area that asks how you want your files sorted.

```
>>Sort: >Name Type Size
```

Move the cursor, with the arrow key, to >Name and the file will list alphabetically; to >Type and you can group all files ending with "LET" or "BIL" or by whatever code you decide will help you organize them; to >Size and they'll be arranged by number of Kbytes with the largest at the top.

MULT stands for multiple, a facility that enables you to backup, list, or erase several files at one time. It's similar to the wild card functions in DOS for copying or erasing files, but it performs them much more efficiently and selectively. You can handle files of different types at one time for an erase or backup—not just .COM files or those beginning with a similar syllable.

FLst prints out the file list so you can tuck the hard copy into the disk envelope for quick reference to the files on that disk. It can be printed in any of the orders in which they were sorted, too. No more wondering which disk contains which files. You can easily compare the files on two disks because the list is printed in a

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single column.

HELP is one way of discovering all the commands you need. You can also reach it by hitting a ? whenever you are in the file area.

What's in the right hand panel? You're told which disk drive is currently logged and which is the backup disk. Want to switch drives? Escape returns the cursor back to the disk area, the arrow key directs the cursor to >Current, and a disk message asks which drive you want for what. Enter the drive letter, press return, and you're done.

The Date key allows you to input the last time you used a disk or a file. The program will integrate with the IBM PC date facility and give you the option to use either the built-in date command or the *SimpliFile* one.

DiskID: means disk identification. A name for each disk is required by Simplifile. The disk identification will appear first in the file list with a — preceding it and a .DID following it.

The File Listing

The headings between the horizontal lines are self-explanatory, with the exception perhaps of CMD, an abbreviation for command. This is the column where you place the cursor, point to a file, and indicate what you want to do with it. The alternatives appear by invoking Help or the ? key for the Help menu.

THE RETURN key will move the cursor down the command line, the up-arrow keys will reverse it.

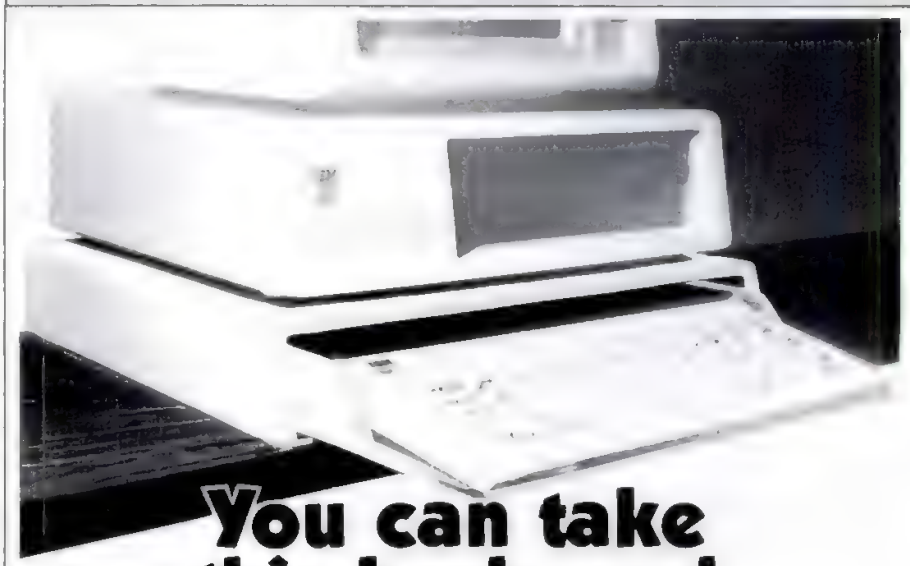
The Help menu provides two sets of commands (see Figure 3). The left side is for the Disk area already discussed. The right side summarizes the variety of tasks you can perform by hitting one letter only (no clumsy operating system lines in which one tiny error will thwart all your good intentions).

One can never fully appreciate the

Figure 3: The SimpliFile Help menu.

```
**DISK COMMANDS**                **FILE COMMANDS**
Sort    = Sort Filenames         ? = Command Summary
Mult    = Bkup, List, Erase      B = Backup File
Current = Current Drive          C = Copy file
Backup  = Backup Drive           E = Erase file
Date    = Today's Date           L = List file
Exit    = Exit Simplifile        M = Multiple file
FLst    = List Filenames         N = Next screen
DiskId  = Identify Disk          P = Previous screen
Help    = Command Summary        R = Rename file
                                 T = Make this top row
                                 V = View file
     **MISC Commands**           X = Execute program

<ESC>   = Escape from action,
  or where you are.
```

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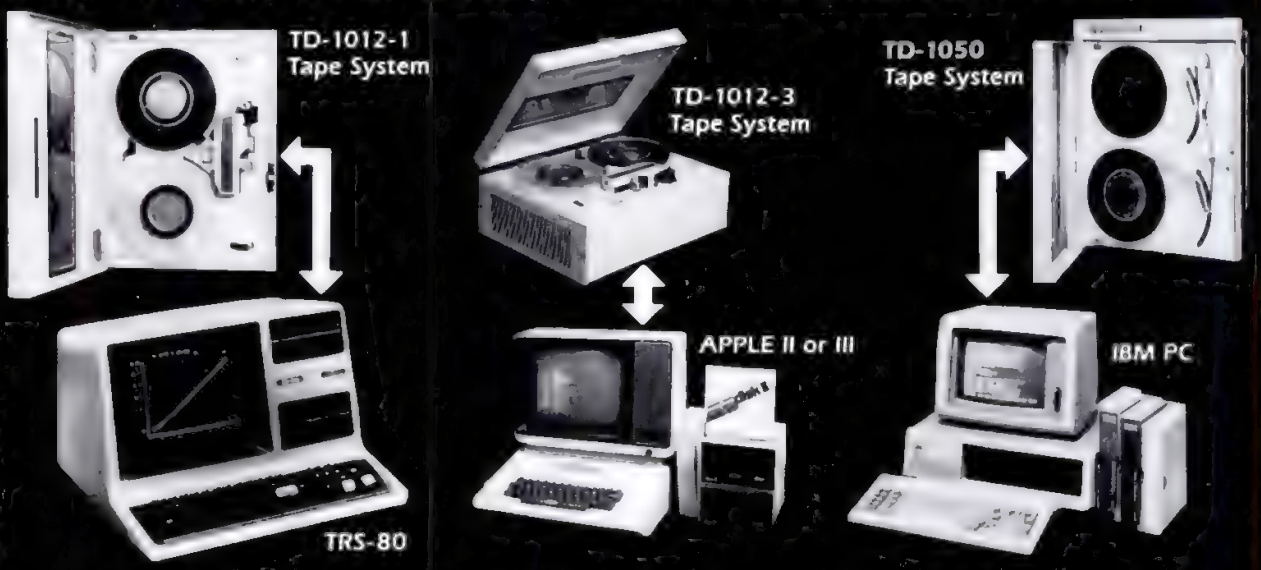
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machinations in a program and its potentials until it has been used several times.

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But commands such as N (Next Screen) and P (Previous Screen) permit you to run up and down a long list of file names like a kitten on a keyboard. No more will you have to contend with a directory listing that disappears from sight into the top of your screen and can only be retrieved by hitting "dir" again. A T placed before any file immediately gives it top row billing on the screen so you can view any nineteen lines at a time.

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Other Features

You'll understand how carefully the program is constructed when you discover that you can enter directly into your most often-used programs without going in and out of DOS. If you frequently use *WordStar*, dBASE II, or another program, it can be installed through the PROGLIST command. Place the cursor in front of the program and hit X for Execute to begin a work session. When you're through, the program's usual exit command will return you to Simplifile so you can update all files used and give them a description.

Should you wish to perform other file cleanup or organization, here's how some of the commands perform:

The Copy command (C) only copies files to the same disk. The Backup command (B) puts them on the backup disk. Performing tasks on multiple files with different names and extensions in one stroke is a decided advantage over the commands in DOS. Place an M (for multiple) in front of every file on which you want to perform the same activity, such as erase, list, or backup; then place the cursor on MULT in the disk area and it's all done.

YOU CAN handle files of different types at one time for an erase or backup.

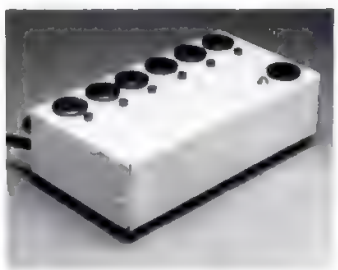
An L (for List) will print out a file with a number in front of each line. It's a bonus for those who require copy editing or line-by-line reference for a program.

You'll soon be comfortable with the cursor movements, thanks to a long "exercise" file list that comes with the pro-

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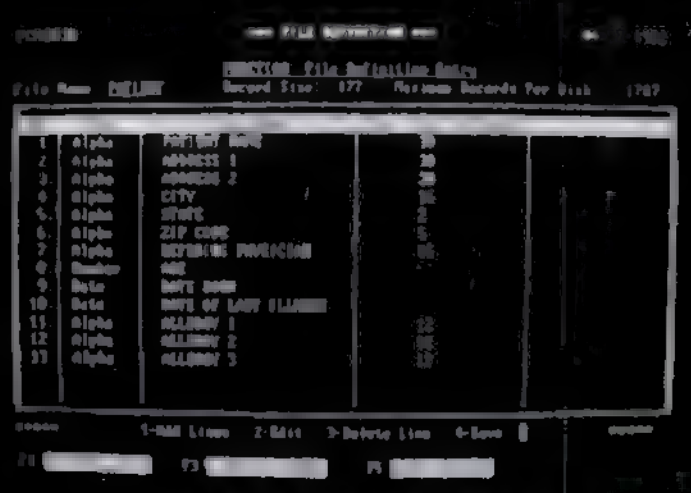
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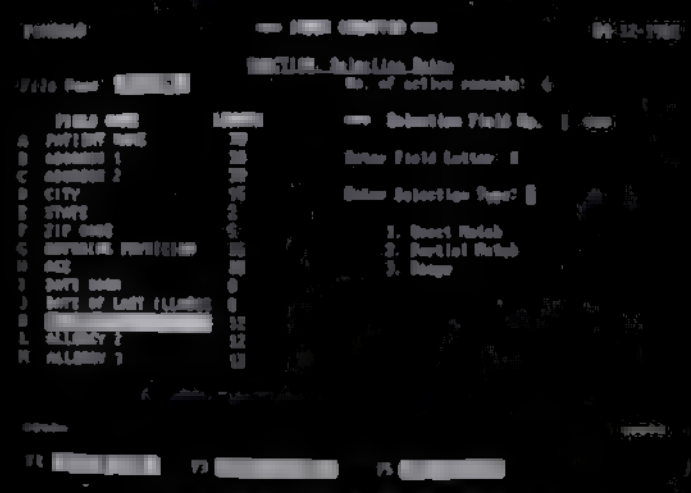
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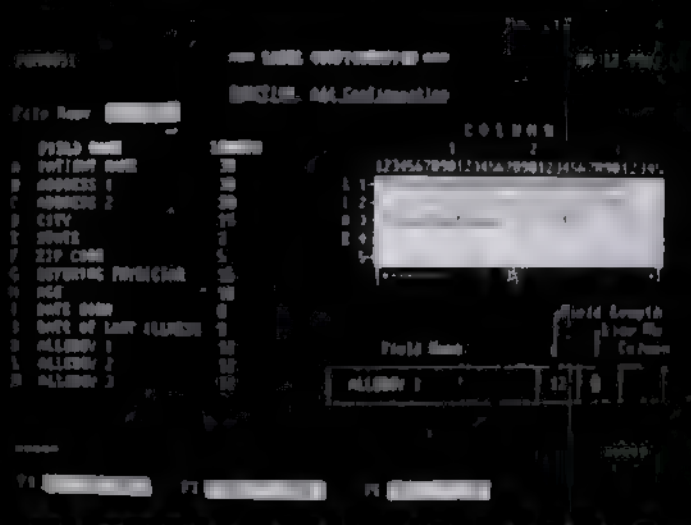
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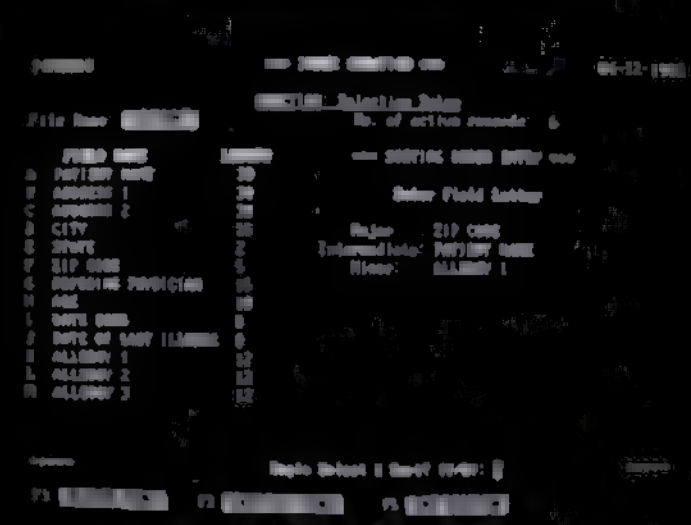
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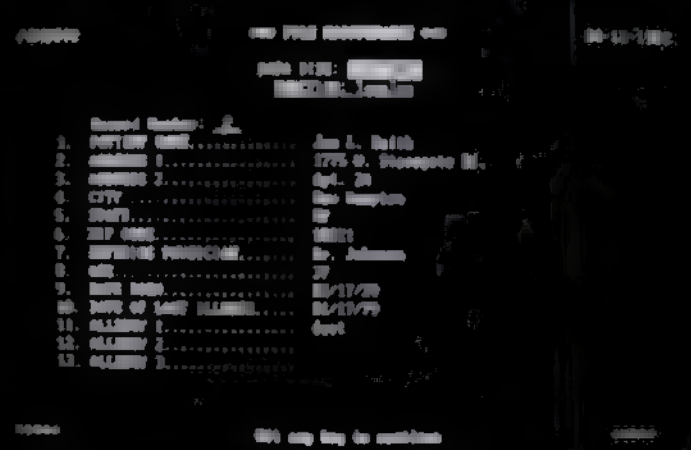
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gram for command practice. Just follow the manual as it introduces each utility for backing up files, erasing them, copying them, renaming them, and viewing them. It takes a little time to understand it all, so don't be impatient.

Practical Aspects

If you have ample space, each disk should have a *SimpliFile* program residing on it. Then, at the end of a session, you can update and identify files while their contents are fresh in your mind. (If you forget what you wrote, just call up view.) If you have limited disk space, the system works with a disk-swapping technique that is easy and practical. *SimpliFile* is available in other 5-1/4- inch and 8-inch CP/M formats.

IT'S NICE to see software that sweeps away confusion.

Documentation

The 38-page photocopied manual is clean and direct, with a table of contents, index, and ample descriptions of each aspect of the program. A few of the directions were fuzzy when I worked the program, but telephone calls to the company and the author quickly clarified the problem. A promise to send a revised page of the directions was fulfilled by the next day's mail. By the time you read this, the manual should be unquestioningly clear. The appendix lists messages that can appear on the terminal.

Author, Author

It's nice to see software that sweeps away confusion and helps the user handle files effectively and efficiently. Credit for Simplifile must go to author Randy Nielsen of Durant Software. Randy's inspiration derived from his mainframe experience as a data processing manager for an investment management company, where it was essential to make computers easy to use for large numbers of employees. His goal? To continue writing straightforward programs to simplify the use of computers.

A program that combines ease of use, supreme logic, and convenience that you soon learn you can't do without, is not easy to find. *SimpliFile* is one of those programs, to be used and appreciated every time you dip into your electronic files. */PC*

SIMPLIFILE is one of those programs to be used and appreciated.

Dona Z. Meilach is the author of the just released Before You Buy a Computer *(Crown Publishers) in addition to 65 other books on a variety of subjects.*

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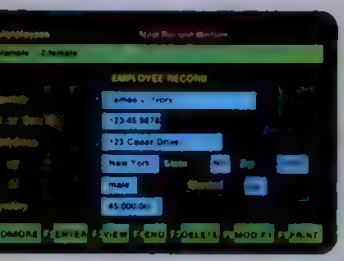
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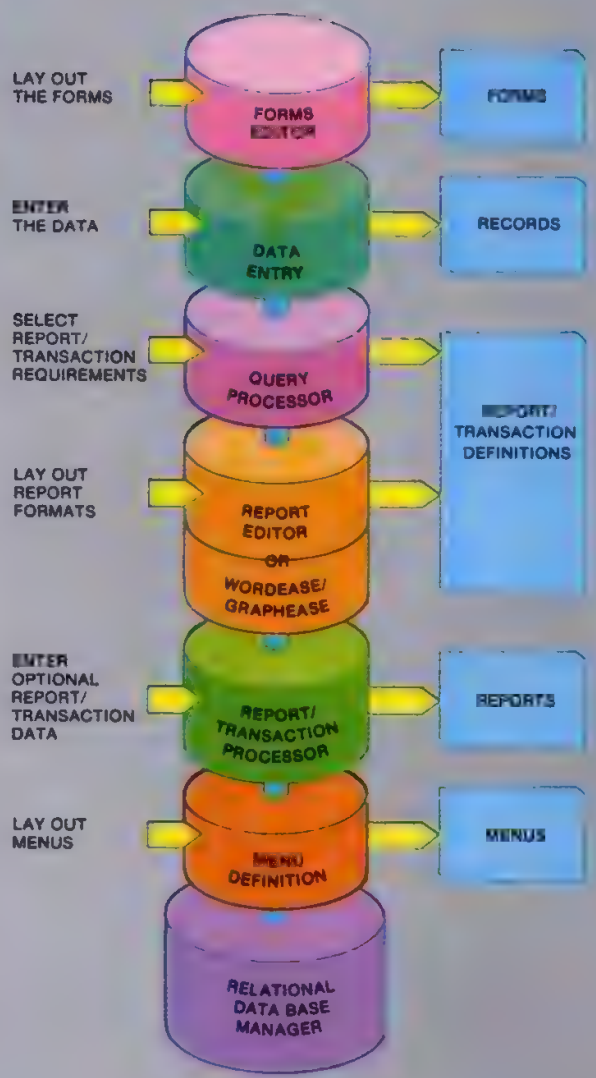
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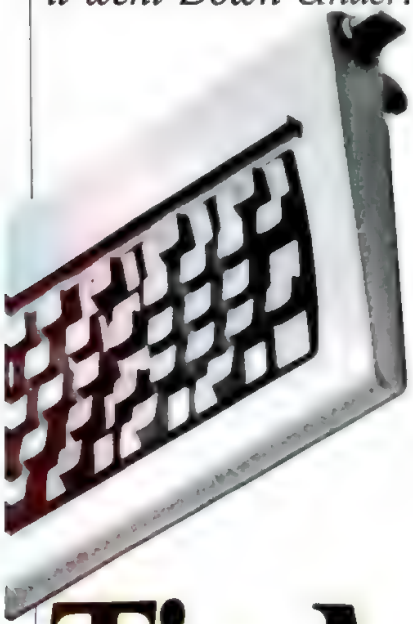
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Selling PCs in Sydney isn't quite the same as selling them in Seattle—as IBM discovered when it went Down Under.



Tie Me IBM Down, Boys

The way Arnold Roth tells it, they're rejoicing from Wagga Wagga to the shores of Shark Bay. Ships that once deposited cargoes of exiled prisoners and ne'er-do-wells onto Australian docks are now offloading crates filled with newly minted PCs.

IBM has finally taken its small systems all the way around the globe. If you were to drill a hole through the center of the earth starting at Boca Raton you would emerge a short ride from Roth's Melbourne office. Roth plans to distribute software and peripherals for the IBM PC and other IBM small systems in Australia and New Zealand. During a recent buying trip to New York he spoke with the editors of PC about the opportunities and problems in selling PC products Down Under.

Selling and Support

The PC is very new to Australia—it was released the first week of February 1983. Roth believes computers will not be marketed the way they are in America, "where they're sold in photo stores." According to Roth, "the typical purchaser is going to want a great deal of support and a great deal of explanation. And he'll need a great deal of persuasion before he makes the decision to walk in your door. Our approach is to sell from within business."

Roth's Software Corporation of Australia is setting up shop in Melbourne but has agents throughout Australia. Melbourne is the corporate center of the country, the financial heart, where most businesses get started. Roth calls it "the Lower East Side of the South Pacific." He claims no one else is doing what he does. "There are a lot of people entering the market who are basically jumped-up mail-order merchants. There is nobody approaching this from the point of view of 'here is a business solution—come to us if you want it.' "

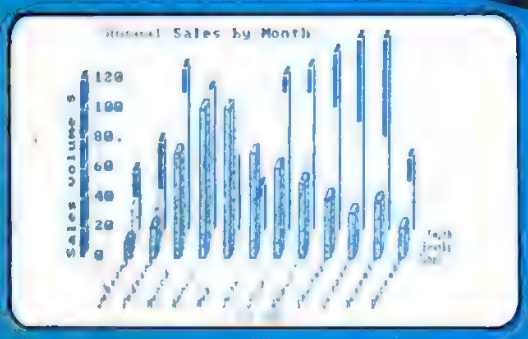
"Most of the people now selling say, 'well it's got whistles and bells and 64 woofers per channel.' You can even see it in the advertisements." His approach is completely different. Roth is a lawyer specializing in financial matters, and works closely with former management consultant and systems expert Jim Landau. They, along with another attorney, Michael Warren, approach potential customers by telling them they understand what an inventory problem is, or how to automate their financial analyses and record keeping.

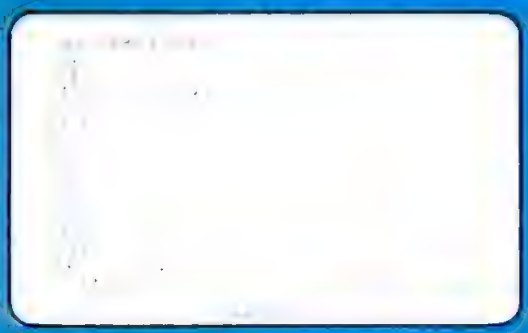
Australia is not as affluent as the

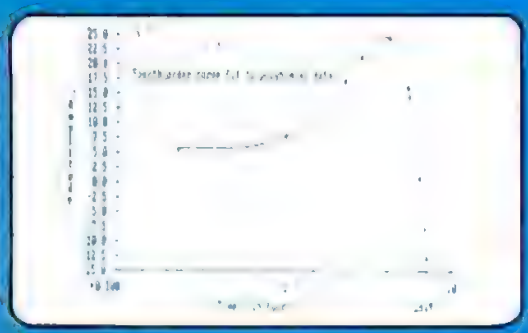
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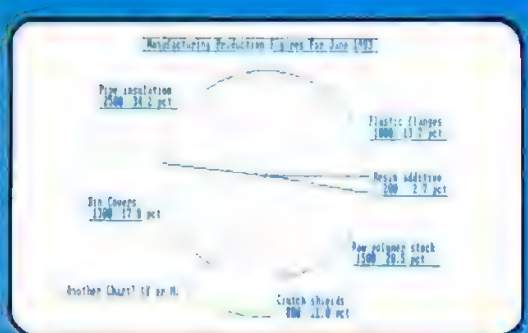
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United States. People have far less discretionary income. As a result, businesses will be the sole purchasers of PCs, at least at the outset. The idea of buying a PC for your living room is still a long way off.

Computer Illiteracy

According to Roth, the Australian market is essentially computer-illiterate. "I've found just talking to average people in America—taxi drivers for instance—that everybody knows what a computer is. They know what 64K RAM constitutes, they know what a daisy wheel is, they know the basics. In Australia, the image of computers is much like that in the Danny Kaye movie, *The Man From the Diners Club*, with punchcards flying all over the place."

"Nobody's been pushing the idea of computers to the average man in the street. Business managers know what computers can do. They're familiar with mainframes and minis—PDPs are all over the place in Australia. But the man in the street has no direct involvement in it—and if you think back to 5 or 6 years ago in America, the same was generally true." The PC II is on the verge of coming out in the United States, but "in Australia they don't even want to know about it. Australia is really a backwater from a certain point of view, and business is often done in a backwater kind of way. That's not to say that there aren't highly-driven people who know what they're doing—and we want to talk to them."

Roth is interested in seeing what will happen when competitive systems begin going head-to-head with IBM. Coinciding with the IBM launch, DEC is spending "enormous volumes of money in Australia—they tried to come out of that sort of hazy technical image that they have, to become a desktop-type company." DEC started their promotional campaign three days before IBM announced its PC. Tandy/Radio Shack is franchised throughout Australia, and Atari is selling quite well. There are even some products in Australia that Roth claims "will never see the light of day in the United States, such as the Hitachi Peach, a very versatile little package, which is very successful in Australia."

The IBM Approach

IBM has what Roth calls "an amazing image—all their people wear white shirts in Australia. It's a very American company—many of their employees are either American or have spent long periods of time in the United States. IBM is run like an American company and they have enormous problems in communicating to Australian business," Roth explained. "That's the reason IBM has not been as successful in Australia—the IBM approach is essentially the white shirt-blue suit-Wall Street approach. It doesn't understand that Australia is laid-back-California style."

"Professionalism is very important," Roth explained. "But Australians are more concerned that someone else has made all the mistakes, done all the pioneering, gotten rid of all the bugs and headaches. When they get the PC, all they want to know is that they can turn it on and it runs. Contrary to the American image, there are no pioneers in Australia."

OUR APPROACH is to sell from within business.

Poor Support

When Roth's law firm bought its first Displaywriter about two years ago he immediately noticed that people in his office felt "assaulted" by the complex IBM operating codes and the "whole litany of alphabetized titles." Most users simply shrugged and told him "Ah, well, that's IBM—they just don't speak to Australia." People there don't want to be told things in Madison Avenue terms, Roth explained, and they're innately suspicious. "IBM doesn't understand that. They simply replicated the American experience in Australia . . . and the support we get from IBM is very poor." He adds that while he has a "very happy relationship with IBM," he objects to the way it markets its products without regard to the Australian point of view.

Roth first became interested in Displaywriters 2 years ago when visiting this country. "We were running into a paper-shuffling problem in our office because we were just starting up. It cost only around $8,000 so when I went back to Australia we decided to buy a Displaywriter. We spent $17,000 and got exactly what we thought we were going to get for $8,000. But we were delighted with it." Roth is an unqualified fan of the Displaywriter. In fact he's on the official IBM lecture circuit in Australia, and speaks on IBM's behalf. After working extensively with the Displaywriter he began looking at the PC. He admits he was also attracted to it because the PC "was causing a revolution."

While Roth questions IBM's marketing techniques, he feels IBM's image should help the PC's sales. Because of the IBM label, customers "feel they're going to get support and that the products will keep pace with new developments. That's a very critical concern in Australia, because we're a young, developing country, where things grow and grow quickly." Decisions on which brand of micro to buy will, he says, be made on the basis of what the purchaser's company will be doing three years down the road and whether the computer will be able to keep up.

IBM is very conservative about projected sales there. Roth has heard that it hopes to sell about 5,000 PCs this year—but IBM was similarly conservative about PC sales in the United States early on. However, the retail stores are budgeting on the assumption that they will be selling two machines per day per shop. And with approximately 50 to 60 stores selling 200 days each year that comes to at least four times IBM's estimate. According to Roth, more than 300,000 personal computers will be sold in Australia between 1982 and 1985.

IBM currently operates one store of its own, plus "a very small sales group," to serve corporate clients. This group has little or no contact with the rest of IBM in Australia according to Roth. "They're set up as a separate unit; they're autonomous, and in fact they appear to actively discourage their employees from having any involvement with the IBM PC."

Educating the Public

Roth feels the market will grow considerably, since IBM, DEC and others are "spending untold amounts in educating the public." He also believes that busi-

ness-oriented software, such as inventory-control packages and spreadsheets should do very well in the Australian market and that the country is "ready for a good word processing program even though there are so many available." To his astonishment, IBM has "ignored reality" and is offering the much-maligned early version of *EasyWriter 1.0*.

He also admits he is going to have an "interesting marketing challenge" when the PC II is released. "IBM has only just announced the PC, and they're not about to release PC II in Australia for a year or two. In the meantime Australians will be reading in American magazines how much better the PC II is compared to the PC—perhaps IBM thinks that Australia is more insular than it really is. What limited information people get about computers comes mainly from American periodicals. They buy Australian magazines only to learn who's selling what. If you want to know what's happening in the world you get an airmail edition of *Byte* or *PC*."

The Cultural Gap

American and Australian versions of the same IBM software packages are not identical. Text processors come with what is called a UK spelling module. Spreadsheets are also different. Australians write dates with the day preceding the month and year. Although the unit of currency is the dollar, Roth has frequently had Australian checks returned by American banks because they thought he had postdated them.

> ***"THE SUPPORT we get from IBM is very poor."***

Roth feels that many of the customizations IBM has made are cosmetic. While it changed "color" on its sales literature to "colour," it used the photograph from its American brochure of a father and daughter fiddling with a PC in their living room—something few Australians would find appropriate. Roth calls this IBM's "blind spot," insisting that "people really do look at the world differently in Australia; they certainly do business in a different way. They're much more British, more courtly and genteel."

Afraid of the Unknown

"The Australian system works very much on the buddy-buddy system," Roth said. "Talent may or may not have much to do with your prospects of success. That's an English approach to doing business, a far cry from the American way of doing things. As a result you've got many people in middle and upper management levels who are basically dodos. If you're going to confront them with the challenge of putting a computer on their desks—or worse still, on the desk of the guy immediately below them, you're going to create disruption and tensions. So far nobody's addressing that in their advertising. No-

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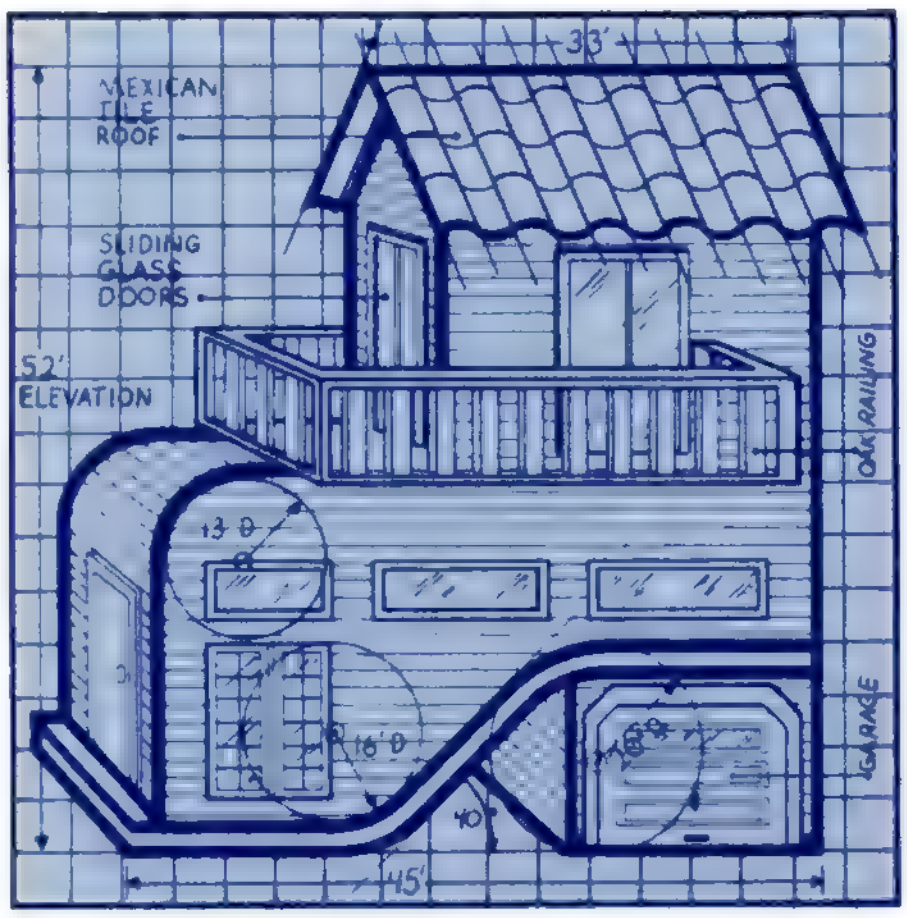
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body's coming to terms with the idea that people are really quite afraid of the unknown in business."

Roth first got an inkling of how IBM operated when he shopped for software for his new Displaywriter. "We can't buy UCSD Pascal. They will not tell you that CP/M-86 is available on the Displaywriter. They will tell you absolutely nothing. They will try to sell you a System 23 if you have an accounting problem—they've done it to us. In fact, a month before they released the Displaywriter they wanted to sell us a mag-card system. It's a funny thing—they try to engender loyalty, they want you to be an IBM house. IBM is big on loyalty," Roth added, "but they use you."

Perhaps as a result of such complaints, IBM recently reorganized its entire Australian operation. According to Roth, IBM now admits they effectively lost two years. Before this change IBM groups were competing with one another for the same accounts and were actually "breaking each other's neck—even on price."

The Australian Experience

"Many small systems manufacturers are making similar mistakes," he told PC. "They see an ad in an American magazine, get the rights to a product and reproduce the exact same ad in an Australian magazine. But more often than not they fall flat on their faces. The words or the message or the level of sophistication just won't transplant." Roth explains, "They

WE'RE A young, developing country, where things grow and grow quickly.

talk about spreadsheets, for example. To most Australian businesspeople, spreadsheets are something you sleep on when you go out into the bush. It just doesn't speak to the Australian experience at all."

Another problem is that there are few, if any, national databases in Australia. In America, physicians, lawyers, and re-

searchers can tie into large electronic reference networks. It is easy for them to become familiar with the computers they use to search for such information. There are many roadblocks to this in Australia. For instance, the copyright laws of the state of Victoria are so knotty that they won't allow replication of either statutes or decided case law. There are even problems getting these things onto paper, much less putting them on line. Roth reports that the federal attorney general just announced that he's going to have a fresh look at this situation. As it now stands, every law firm has to have its own library and there is no opportunity to create a central legal database.

Fragmented Markets

The Australian word processing market is very fragmented. There are many vendors and seemingly few takers, apart from perhaps the few top law firms. Roth claims he has had success talking to lawyers about computers in terms of function, by saying, "Here are the kinds of things you can do." He contrasts this with the approach used by companies like IBM, Lanier, or Wang, who "are not oriented towards discussing the problem in terms of its function. They'll give you advanced management studies that say how much faster it is to produce a letter on a word processor."

"And it's all jargon because the very first time you have the system in your office you discover that it may take your secretary a very short time to key it in but it takes a considerably longer time to put the paper into the feeder—unless you have an automatic sheet feeder, and nobody talked to you about that."

Roth is particularly interested in communications to host mainframe computers and the kinds of menu-driven operating systems just coming on the market in the United States. Australian executives in large corporations have worked with mainframe computers for years and understand how valuable they can be. But they don't want to learn the arcane command language needed to run them. They would like nothing better than to use a PC to calculate bond redemption yields, or discount treasury notes, then compare the two by producing a graph of the results. But they want to be able to do it at the touch of a button or two.

He is also looking into telecommunication equipment, because networking is so important to Australian business. "We are a dispersed business community. There's 580 miles between the two closest major financial centers." His company is exploring local networking, and communications with the PC as a terminal for a central host computer. "Our primary interest is in getting the PC to talk to System 38s and 34s. And we'd also like it to do long-distance communications—either through the dial-up network or some sort of leased-line arrangement."

The Growth Areas

Medical practices also represent very good marketing prospects in Australia.

PEOPLE really do look at the world differently in Australia.

Doctors are very aware of tax deductions for office computer systems. However, many Australian doctors are clinicians—who build up case histories, talk to their patients at length, and prefer extensive personal contact to high-technology tools.

Medical practices are run on a much smaller scale in Australia than in the United States. There are many clinics in America where different specialists work together with diagnosticians. In Australia, however, the average practitioner runs a small, country-doctor-style operation. It's a cash business; the patient comes in, puts his $15 down, and gets a consultation.

Roth feels that selling such physicians computers would be doing them a disservice. Normally medical practitioners could use a computer system that would give them control over their debtors—but in most cases there are no debtors. And many would be wary of purchasing a computer as a diagnostic tool. The larger clinical practices, on the other hand, are definitely a good market for computers.

From a systems viewpoint, doctors fall

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in the category of "practice management." It wouldn't be difficult, Roth contends, to create a standard set of processes

THERE ARE few, if any, national databases.

that would manage most professional businesses. Such a basic package would satisfy doctors, dentists, vets, realtors, and many others.

Kangaroo Software

Roth has calculated that it would probably cost between $50,000 and $60,000 to introduce a particular piece of software throughout Australia. Because of this, he thinks it might be necessary to "reconfigure the market postures" of certain products. "We may take three separate products and call them all 'Kangaroo Software,' so that we create a 'corporate suite' of software."

All of his efforts will be focused on IBM small-systems software and peripherals. Why is he hooked on IBM? "IBM seems to be pretty hooked on Australia. They have a better understanding of marketing in the abstract sense than anybody else. Cromemco has a great product, but they don't know how to sell. There are a lot of good products about. If you want to find a good system you can find it—but the market is not filled with people looking for a good system. There is simply a market of people with problems. They may be open to the suggestion that you have an answer to their problem. Now whether that answer is an abacus or a plug-in computer is a matter of some indifference to them, so long as you can provide them with the results they want."

Roth is optimistic about the future. He feels that some of the upcoming computer shows may for the first time begin to "communicate the message of personal computers to the masses." But for now, he is eager to begin selling to the thousands of businessmen and professionals who are discovering the power of the PC./*PC*

TO MOST Australian businesspeople, spreadsheets are something you sleep on when you go out into the bush.

For more information contact Arnold Roth, Software Corporation of Australia Pty Ltd., 449 Swanston St., Melbourne 3000, Australia, Telephone: 1-613-347-0666, New York Office: (212) 847-4182.

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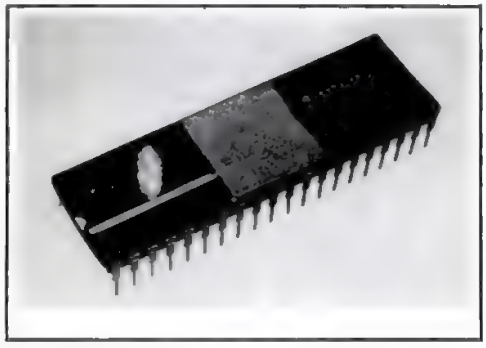
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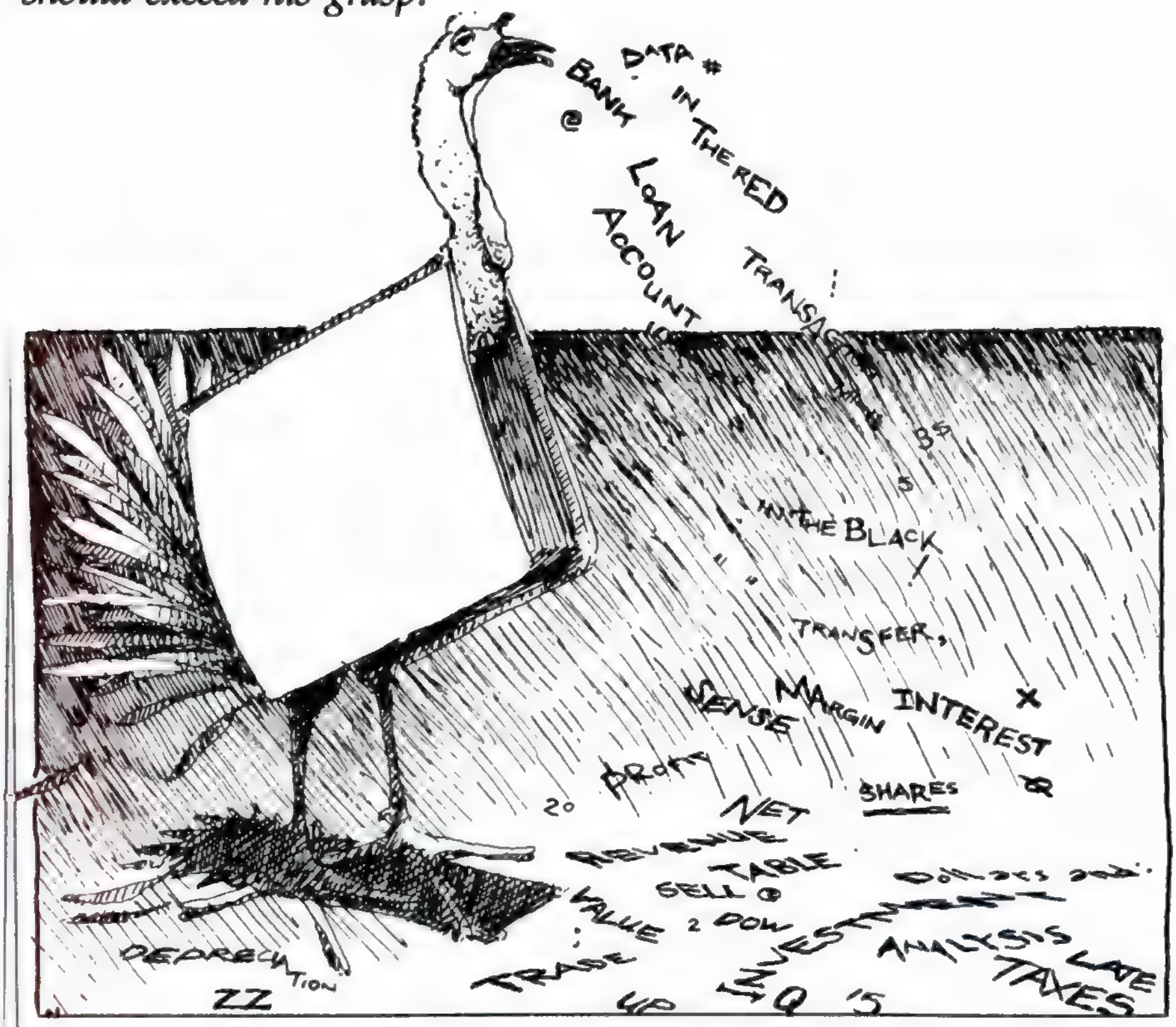
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CIRCLE 276 ON READER SERVICE CARD

A trio of earthbound WordStar utilities leads a reviewer to question the old saw that one's reach should exceed his grasp.



Open File, Insert Foot

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Pair (Version 2.01)
Bibliography (Version 1.0)
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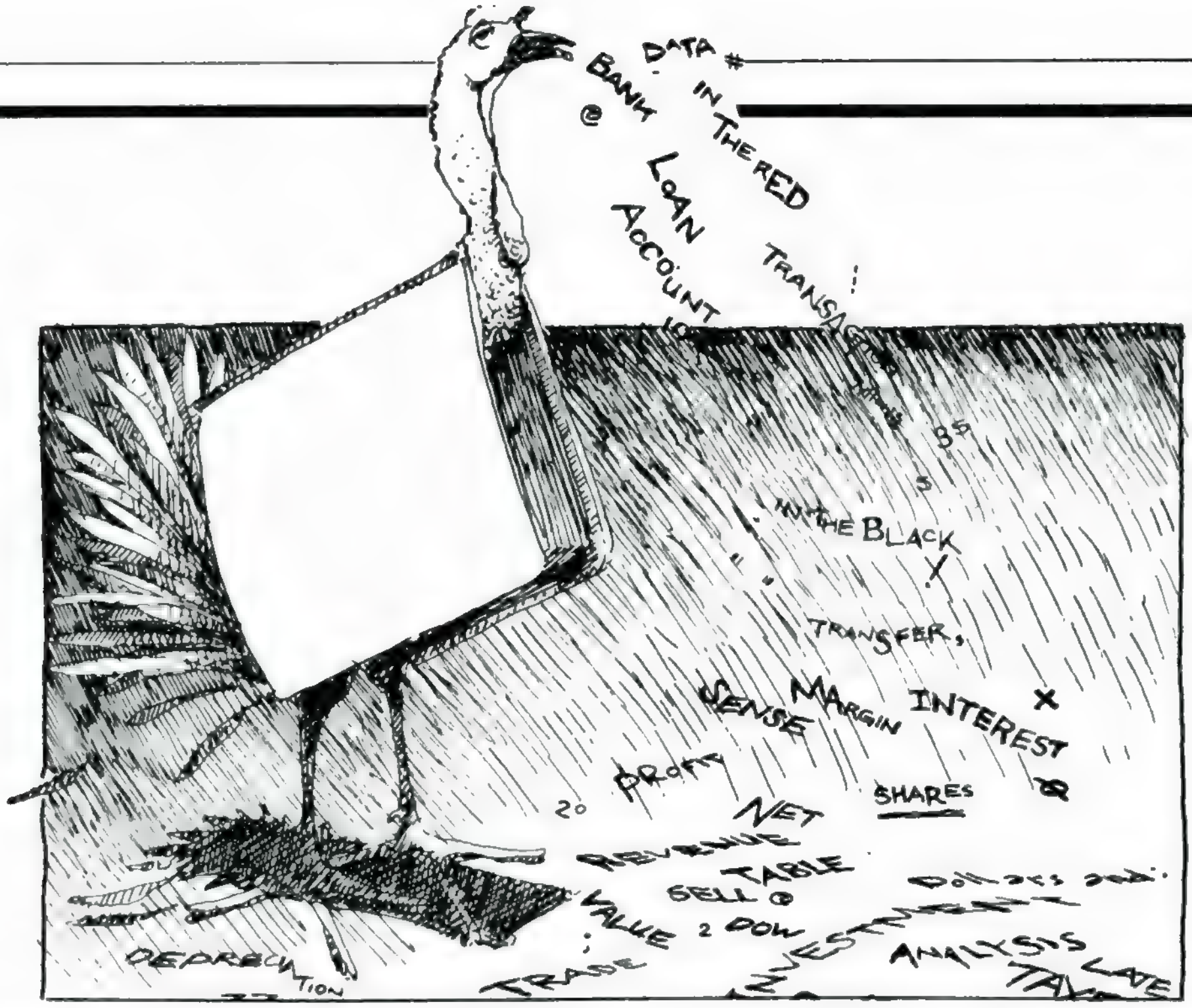
CIRCLE 589 ON READER SERVICE CARD

"Computers," snorted the crusty old guy at the Underwood typewriter, "let you spend 2 weeks figuring out a slick way to save 5 whole minutes in your entire lifetime."

As someone who can no longer contemplate the dread thought of writing without a computer, I shrugged Underwood off as just another technophobe. But after what seems like an eternity with *Footnote*, *Pair*, and *Bibliography*, I begin to see exactly what the old guy was talking about.

Footnote, as the manual says, "numbers and formats calls and notes in WordStar text files." Its companion, *Pair*, checks to see whether commands such as the ones used to begin underlining and boldfacing actually end where they're supposed to, a clever way of keeping your printer from spitting the last half of a novel back at you beautifully underlined because you forgot a single Ctrl-S.

Bibliography, sold separately, "compares citations in a manuscript with the keynames of entries in a Library file and



constructs a bibliography of all entries cited." We'll explain this later.

All About *Footnote*

The manual says *Footnote* will run on a 64K PC in either PC-DOS—the version I tested—or CP/M-86. I ran it from DOS and from *WordStar*'s somewhat unpredictable R (run) command.

Footnote formats footnotes in all sorts of ways. You can print the notes on the same page as the reference, or you can put them in a separate file. You can even have the program split the footnotes across page breaks when they won't fit on the current page.

You enter notes while working on your text in *WordStar*, but the procedure isn't exactly simplicity itself. First you type an @ where you want your reference to appear in the text. Then, to enter a footnote, you insert a Ctrl-R (by typing Ctrl-PR), strike the Enter key enough spaces to indent your footnote from the margin, another @, and your text. Finally you type another Enter and a .pa command to terminate the entry.

To save time, you can group footnotes between any single Ctrl-R and .pa pair. The notes can be entered anywhere in the text, provided they follow the references to them and appear in the proper order. But since you don't enter any footnote numbers—only @ signs—keeping track of which note goes with which reference can be confusing.

The procedure causes some occasionally unpleasant surprises. Since the .pa command is what *WordStar* uses for a page break, the first *Footnote* .pa command renders the *WordStar* page break display and page-count functions useless. You can ignore them or shut them off, but it might be smarter to devise a routine to postpone the insertion of the .pa commands until just before running *Footnote*. If you want to specify conditional or mandatory page breaks, you must insert an extra dot in front of the traditional *WordStar* .cp and .pa commands.

Once you've peppered your text with @ signs and Ctrl-R's and footnotes and .pa commands, you're ready to call up *Footnote* by typing FN. The *Footnote* files must be on the logged disk drive or on a drive A.

A Menu of Options

Footnote displays a menu of five options, one of which is to exit the program. You begin with 1 (or N) to Number the notes. After you enter the file name and starting note number, *Footnote* goes through your file, pairs up the references

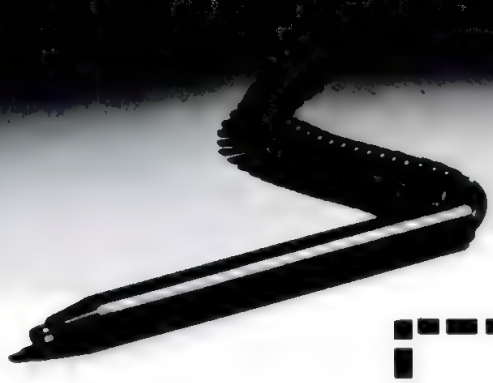
THE PROCEDURE causes some occasionally unpleasant surprises.

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and notes, numbers them, inserts WordStar control characters so that the numbers will be properly superscripted or underlined, and adds some special control characters of its own: Ctrl-E, Ctrl-Y, and Ctrl-R by default, though you can change these. It also renames the original version of the file as (FILENAME).BAK, just in case there are problems, which there might well be.

The omission of one Ctrl-R or one .pa or one @ sign will generate some sort of error message. Your challenge is to go back into the numbered file and try to figure out where you goofed. This may not be easy. For example, if you've omitted one @, *Footnote* will likely have mispaired all your subsequent references and notes. Fortunately, once you make the omitted insertion, you won't have to renumber them — *Footnote* will do that for you next time you run the Number function. *If* you do everything right.

Once you get through Number successfully, you select the Format option. This time *Footnote* goes through your text and reformats all your pages, sticking the footnotes at the bottom of the pages where they're referenced. It also renames the Numbered file as (FILENAME).BAK, thereby obliterating your original file completely. To be on the safe side, I'd copy my precious text file to a different

YOUR CHALLENGE is to go back into the numbered file and try to figure out where you goofed. This may not be easy.

file name before entrusting it to *Footnote*.

Format is not exactly a speed demon. It took about 2 minutes to go through a five-page document with 17 footnotes, even with the 192K of memory I have available, because the program does a lot of writing to disk. It can also do odd things like discard the last line of your text if you forget to follow it with an Enter. But what it gives you is certainly impressive: a new

WordStar document ready for printing, with all the footnotes on the bottoms of the proper pages.

Stacking Footnotes at the End

If you prefer to put the footnotes at the end of the text, you run the Remove option instead of Format. You specify the name of an auxiliary file for the notes, and *Footnote* will yank them from your file and put them there. Then you can read them into the end of your text file. If you want the separate file of notes inserted back underneath the text, you select the final option on the menu (Merge) and *Footnote* will reconstruct a document with notes at the page bottoms.

Now, all this sounds pretty nifty, and it is. Unfortunately, it took me a whole working day to begin to learn how to do it. The program isn't exactly hospitable, and, to put it politely, the documentation is worse.

Take the section called "Trying out *Footnote* without reading the rest of the text." First, as instructed, you use *WordStar* to examine the file called SHORT.TXT. The manual tells you what you should expect to see in the file. But the text in the file doesn't match up exactly with the text in the manual. In fact, if you bother to read the whole screen, you

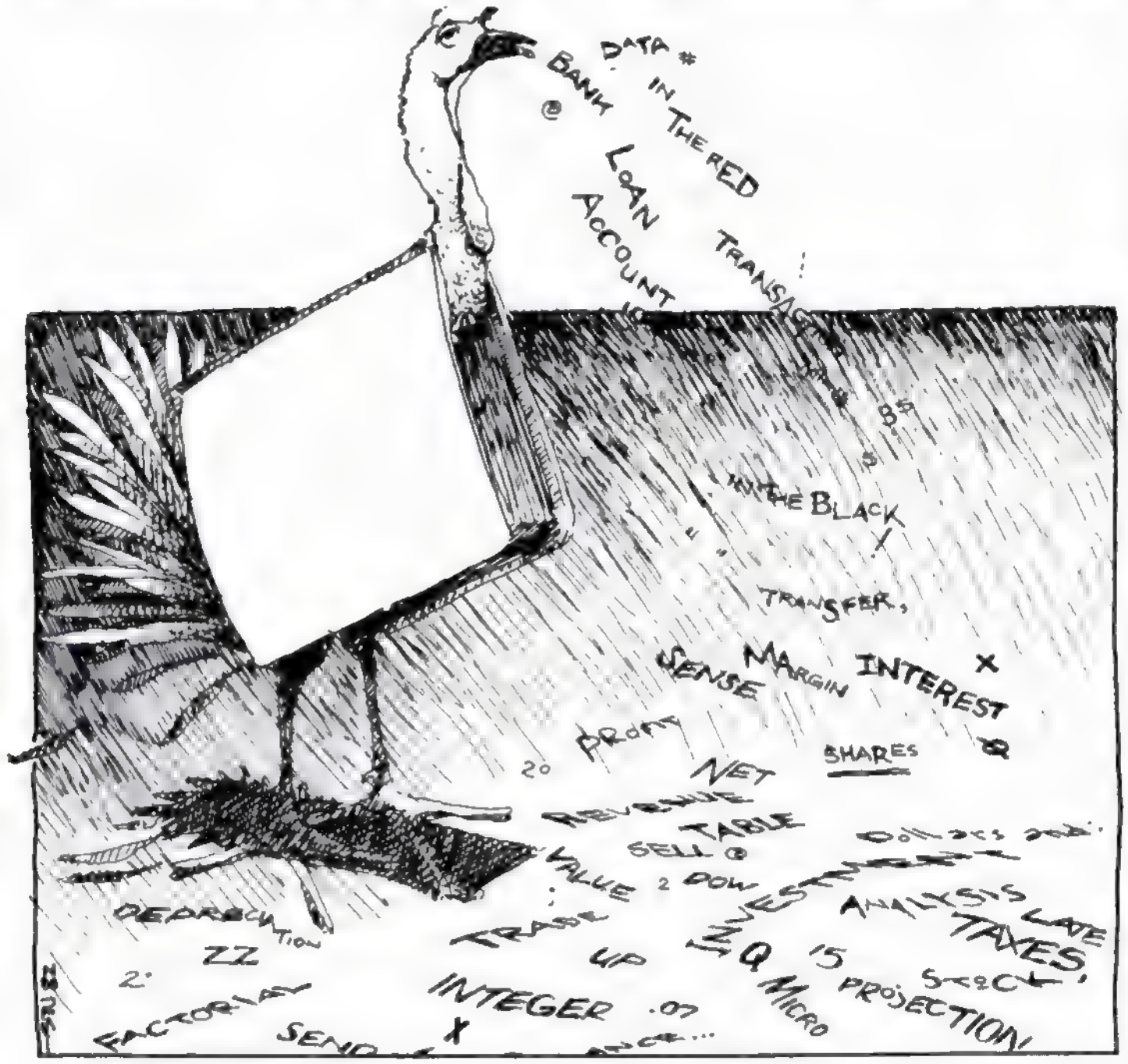
THE TEXT IN the file doesn't match up exactly with the text in the manual.

notice something extremely interesting peeking up at you from the very bottom, down on line 25. It reads:

```
ATTENTION!! ERROR IN USER'S
   MANUAL
```

You sagely hit the Pg Dn key. And you discover a message informing you that "the printout of SHORT.ORG on page 3 of the Footnote User's manual" is in error and advising you to follow the example "in the file SHORT.ORG on this disk."

Kind of the program to let you know, except for one minor problem: there was



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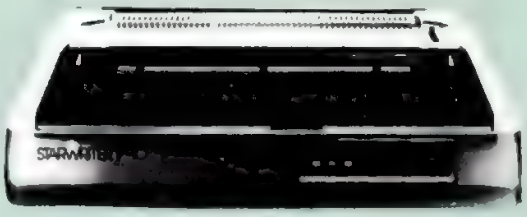


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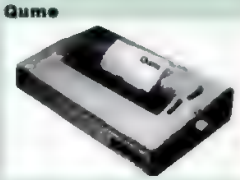
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no file SHORT.ORG on the disk supplied to me. What's meant is SHORT.TXT — the file currently being read.

A Video Surprise

What happens on the screen when you use the various *Footnote* options is also a surprise. While Format is running, for example, it displays an ever-growing row of asterisks and broken vertical lines. Apparently this is normal, but you'd never know it from the manual.

Nor does the manual contain a list of error messages and their interpretations. When you get an error message—and I got quite a few—all you can do is go to the 1½-page section on errors and hope it'll help. Often it doesn't.

The manual also ignores the fact that you won't get superscripted footnotes at all if your printer won't do superscripting from *WordStar* with the Ctrl-PT command. This leaves out any printer that can't do reverse line feeds: the original IBM (Epson) printer is exhibit A. In fact, the way *WordStar*'s Install program is written, you must modify or "patch" *WordStar* to activate the Ctrl-PT command for any printer running from a parallel port.

This is in part a failing of *WordStar*, but there should have been at least token acknowledgment of it in the *Footnote* manual. Evidently Pro/Tem hasn't yet considered the special idiosyncrasies of the IBM version of *WordStar*. The manual has no IBM-specific information at all. It instead tries to cover all versions of *Footnote* at once, leading to locutions like "The distribution disk contains FN.COM (or .CMD or .EXE, depending on your computer) . . ." and references to Appendix D of the *WordStar* manual, which does not exist in the IBM version.

The manual can even lead you astray about the way the program works. It claims that "*Footnote* uses the Ctrl-E for its own housekeeping: the character will not print out."

True, the *character* Ctrl-E won't ever print out. But if you happen to have patched your version of *WordStar* to use Ctrl-PE (which produces a Ctrl-E onscreen) for some other function, such as expanded characters, expanded characters are what you will get in your hard copy from the first footnote reference right on through the end of your text. The same thing is true of the copious Ctrl-R's and occasional Ctrl-Y's *Footnote* sticks into your files. If you've patched *WordStar* to use these three commands, you have two options: change the defaults in *Footnote*, or use Debug to unpatch *WordStar*. If you've got a lot of patches in *WordStar*, you may have to do both. There just aren't enough control characters to go around.

YOU WON'T GET superscripted footnotes at all if your printer won't do superscripting.

Editing the Options

The way you change the *Footnote* defaults is to edit a file called OPTIONS.FN, which isn't even consistent with its own internal onscreen documentation. One parameter is listed as FNUMOPT at the top of the screen, but referred to as CALLSTYLE exactly 28 lines below.

By editing this file, you can change the character that marks the notes; the style of the references (superscripted, superscripted and underlined, or underlined with a following backslash); the style of the footnotes (superscripted or on the line with a following period); the three control characters the program uses for housekeeping; the length of text on pages with footnotes and pages without them; and whether footnotes will be split between pages if there's not enough room for them on the current page. But you can't omit or change the length of the rule that appears between text and footnotes. If you want footnotes at the bottom of the page, they'll appear beneath a line of 20 underscore characters. My guess is that you can edit this line after running *Footnote*, but don't look in the manual for the answer.

THERE JUST aren't enough control characters to go around.

Woe betide you if you make an error in modifying OPTIONS.FN. Apparently *Footnote* doesn't carry defaults of its own, and it isn't smart enough to recognize something rotten in the OPTIONS file. Just for fun, I deleted the number called

FNUMOPT (which you could easily do by accident while editing it) and then ran *Footnote* on the sample file. *Footnote* blithely destroyed every footnote in the file without offering so much as an error message.

That's not the only way *Footnote* can nail you. Once you commit to working on a file, *Footnote* won't always let you out. In certain situations, there's no graceful way to back out short of a full three-key system reset.

A Demonstration of Errors

When you run the six-page FNSAMPLE.TXT through *Footnote*, you discover (aside from the typos in the text—one of which appears in magazine ads for the program) that an extra blank line is inserted between note 13 and note 14. It's there on the screen and it's there when you print it out.

Now, if the people who wrote *Footnote* can't get their program to do the job it's supposed to, what chance do you or I have? I've looked at the sample, and I can't find any extra characters where they shouldn't be, so I have no idea what's wrong. Clearly, though, the program allows absolutely no margin for error in entering the footnote copy. A single extra character can throw the entire document off. Of course, you can correct an error and reformat—*if* you know the error exists. If I used *Footnote*, I'd scan the formatted documents with an awfully careful eye before I printed anything.

A lawyer acquaintance tells me she'd love to have a program to let her do footnotes and move them around and then renumber them all just before printout and put them back into the proper place. There may be a good way to do this with *Footnote*, but the manual isn't telling. It does say "you can easily add or delete text and notes" to a formatted file, but one page later it reconsiders and admits that "Moving a block of text containing footnote calls or a block that spans a page with footnotes can be cumbersome." Half a page of instructions follows.

Footnote seems to do most of what it claims, but without an extensive, professional manual, I can't recommend it. It might do for someone who desperately needed footnoting capabilities, but you might find you could enter a passel of notes in *WordStar* files manually in the time it would take you to learn how to handle *Footnote*. And if you do a lot of footnoting, you'd probably be better off with a word processing program like *The Final Word*, which has the function built into it.

Besides, before committing valuable text files and learning time to a program, a user wants to have some assurance that

FOOTNOTE isn't smart enough to recognize something rotten in the OPTIONS file.

it'll perform. How much confidence can you have in a program that doesn't even handle its own demonstration files properly?

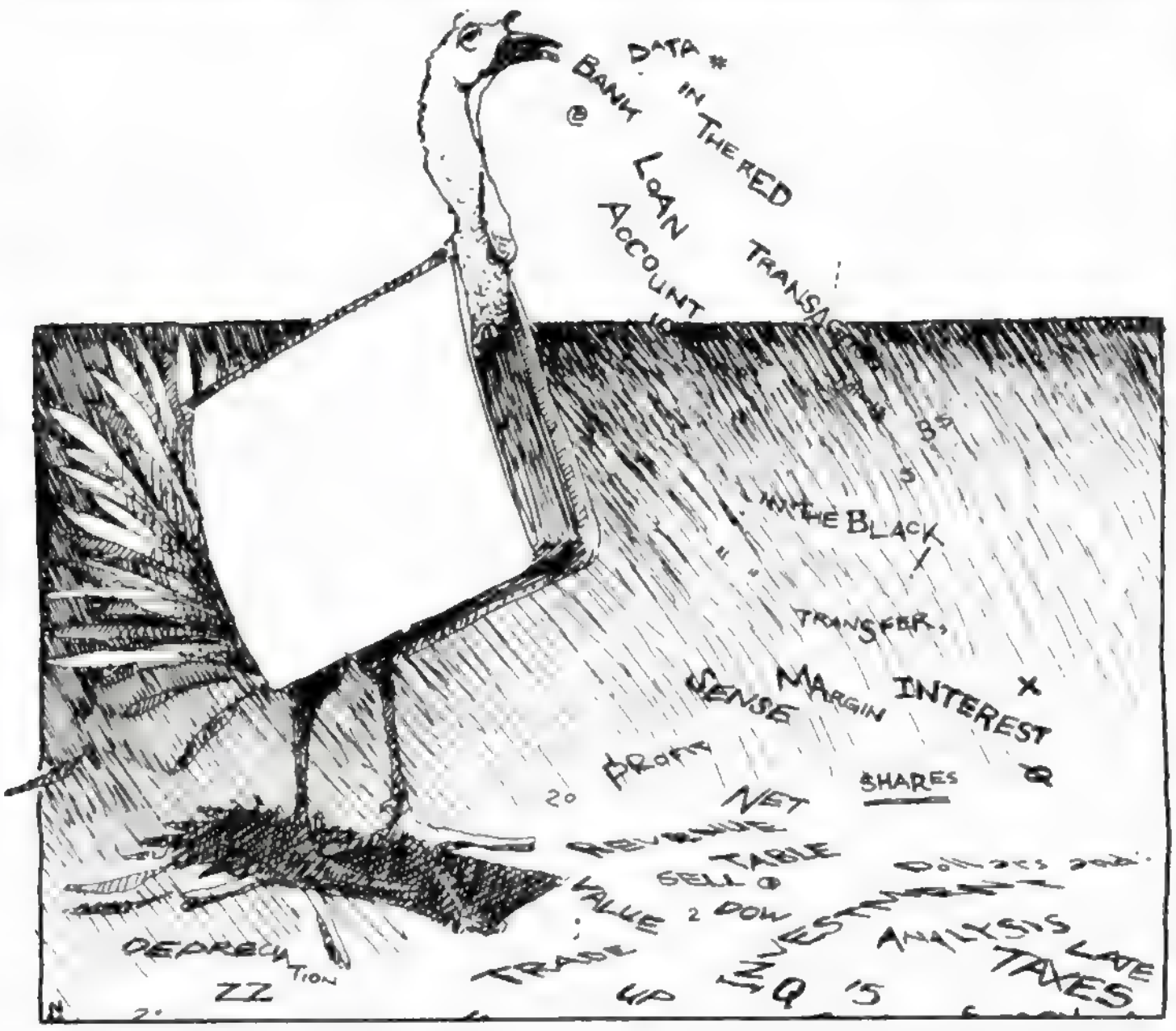
Oh, Pair!

The companion program, *Pair*, is the only piece of software I've ever run into whose warranty and copyright notice is nearly as long as the rest of the manual. The instructions for *Pair* take up nearly two whole pages.

In part, this is because *Pair* doesn't do all that much. What it does is check to see if control characters that should have matching terminators actually do have them. It will also check for pairs of identical characters, such as quotation marks and single quotation marks. And it can find out whether each left parenthesis, bracket, or brace (but not angle bracket) has a right-hand mate.

You run *Pair* by typing Pair, a file name, and the letter of the control character or the actual punctuation mark you're looking for. If you forget to type a character after the filename, it looks for Ctrl-S (underlining), a default that can be changed. *Pair* searches through the text, displays what it finds between markers, offers error messages when it doesn't find a match within a user-selectable number of characters, and marks the text with a user-definable character.

It seems to work. While it's working, it sends a lot of unnecessary (and undocumented) stuff to the screen, including meaningless paragraph marks and double exclamation points and black-and-white happy faces, some high-intensity, some



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low. It doesn't seem to display an error message every single time it finds a mismatch. But when it's done it does give you a count of how many markers it has stuck into your text, so you can go back into *WordStar* and check them out with the Find command.

PAIR IS A rather cockeyed execution of an excellent idea.

No Second Chances

The problem is that *Pair* requires one pass through the text for each character and makes you reinvoke the program each time. You get no second chances. If you specify a nonexistent file name, you get an Abort error message that unceremoniously sends you back to DOS or *WordStar*, forcing you to call the program up again. If you use a lot of paired commands (say, underlining, subscripting, superscripting, boldface, and four types of punctuation), checking a file is tortuously slow. It would be a lot handier if you could give the program a table of things to look for and let it do its job in one pass, but *Pair* doesn't work that way.

It can also be fooled. In the case of parentheses, for example, you have to ask it for the left character of the pair. If you ask it for the right, it'll look for pairs of two rights and get confused. You won't get an error message, just a lot of needless markers to remove from your text. *Pair* does not create a backup file.

There are errors and points of confusion in the documentation, too. The standard default is 200 characters between the characters to be matched, but there's another default of 255 built in. Depending on circumstances, you get one or the other, and the manual manages to refer to both in typically ambiguous fashion.

I guess I might run *Pair* once in a while to make sure I didn't mess up and get a long stretch of underlined text. But, like *Footnote*, *Pair* is a rather cockeyed execution of an excellent idea.

Building a Bibliography

Finally we come to *Bibliography*. The documentation claims it will work with text editors other than *WordStar*, something I was unable to confirm. What I expected it to do was take the footnotes in a document and construct a sorted bibliography from them—something a scholar might pray for.

But what *Bibliography* does is a lot less useful to most people. It lets you construct a whole library file of bibliographical entries;

```
%Key:Keefe, 1983
%Author: Keefe, Janice
%Title: Recreational Knitting
 For Expectant Mothers
 (Softwear For Infants):
%Pub: Berkeley: University of
 California Press, 1966
%:Annot:
%:
```

When you make citations in your text, you enter them in the format: %Keefe, 1983. You can then use *Bibliography* to pull the entries out of the library file and construct a custom bibliography for your particular document.

I have a hard time imagining who would really need such a program. How many people keep referring to the same

Following completion of our review, Pro/Tem Software, responding to many of the criticisms brought to its attention by writer Stephen Manes, announced it would issue Footnote version 3.1 and Bibliography version 1.2.

Spokesman Paul Brest said that some of the changes had already been made—although they were not reflected in the copy of the programs sent to PC in late January. Brest said other alterations will include an improvement in the appearance and some of the presentation of the manuals, a switch in the footnote style to reflect the University of Chicago Manual of Style, and a change from "Havard" to "Harvard" in the demonstration package. The basic operating design of the three programs will not be changed.

Would-be purchasers of the program would probably be well served to look for the "improved" versions of these programs now and in the future.

set of books over and over again in their writings? Scholars, I guess. Or is this another example of a programmer filling a nonexistent need?

Once again the manual and the samples deal a knockout punch to the program. When you print out a bibliography in "concatenated" form—continuously, rather than with line breaks as in the example above—you get the entire entry on one line. As the manual ingenuously states, when you choose this option "you will probably have to use the text-editor to format the transferred entries to adjust the margins." Probably? Well, unless you have a printer that runs out to column 163.

Bibliography doesn't even produce a standard bibliography format. *The University of Chicago Manual of Style* and other standard references show periods following the three main parts of each entry in standard bibliographic style. *Bibliography* puts commas where those periods belong, and there's no way to change

IS THIS another example of a programmer filling a nonexistent need?

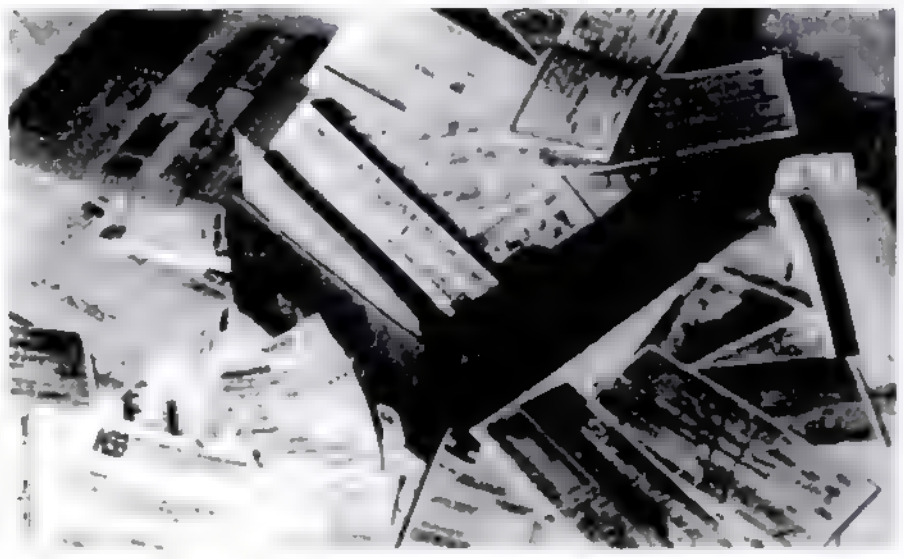
that default. What can you expect from a program whose sample entry refers to that venerable publishing house, the Havard [sic] University Press?

The *Bibliography* documentation refers to a disk file called SAMPLE.TXT when no such file exists. And it says it will work in conjunction with *Footnote*. But it does not give you a clue as to *how*.

Maybe it's just as well. I wouldn't have had the guts to check. And frankly, I didn't have the stomach for checking up on the rest of the *Bibliography* options, such as sorting and listing libraries, and merging bibliographies. I exited the program and entered Jack Daniels. */PC*

Free-lance writer Stephen Manes uses his PC—and WordStar—to prepare magazine articles and a novel in progress.

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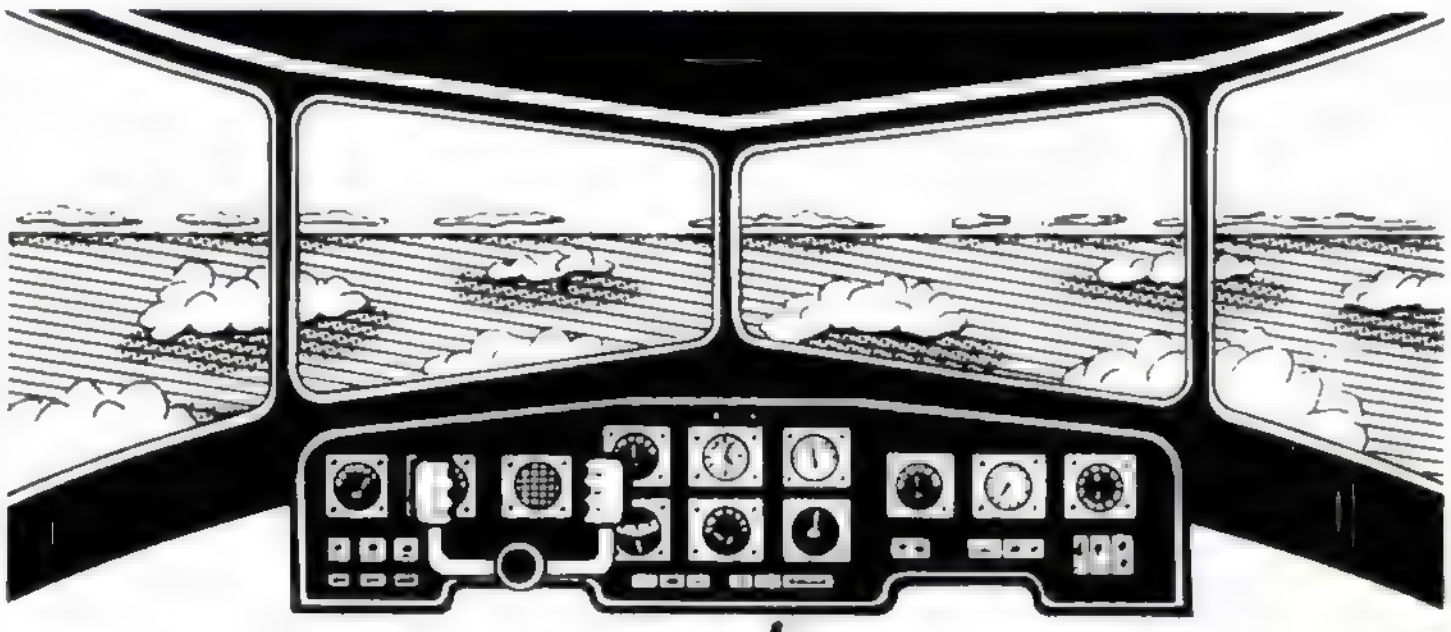
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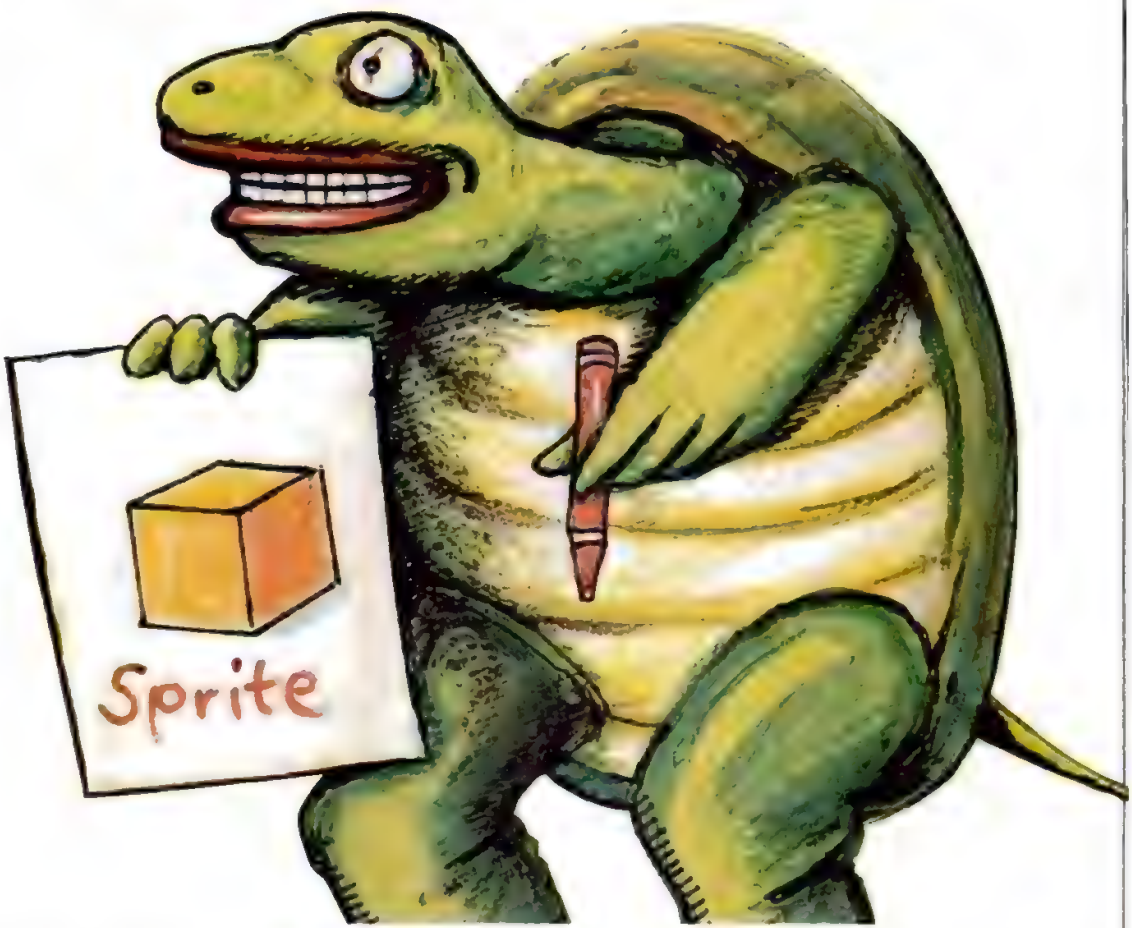
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Gary Kildall's announcement promises a powerful, graphic conclusion to PC users' long wait for a turtle to arrive.

DR LOGO: A New Start For Beginners



BASIC's days as the standard beginner's computer language are numbered—so hopes Digital Research. The company has just announced its own improved version of the LOGO language, DR LOGO, a graphics-oriented interpreter the company believes will be even more comprehensible to first-time users than earlier versions.

DR LOGO (or "Doctor LOGO," as it is nicknamed within the company) was written by the founder and president of Digital Research, Gary Kildall. When Kildall presented the new language at the CP/M'83 computer show held in San Francisco last January, he didn't mince words. "We're going to replace BASIC—that's the whole motivation," he said.

Stephen Maysonave, the company's director of field operations, stated it less bluntly. "It won't replace BASIC entirely," he said, "because there are already so many applications written in BASIC. But anyone who's never used BASIC finds it easier to use than BASIC. We think it will eventually displace BASIC as a first language."

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Software Breakthrough...

NEW *QUIKPRO + PLUS* WRITES PROGRAMS FOR YOU IN MINUTES ON *YOUR* Micro

Technical Review
by Wayne Hepburn

QUIKPRO + PLUS is a new breakthrough in software for microcomputers from ICR-FutureSoft.

Until now, whenever you wanted a new separate program in BASIC (Microsoft Basic/MBasic/Basic 80/Oasis Basic), you had to spend a lot of dollars for it, or a lot of hours creating it (if you have the know-how). That's all in the past now.

Anybody who can turn on a computer can write a program, quickly, with this new *Quikpro + Plus* software which generates programs for you. *Quikpro + Plus* is the invention of Joseph Tamargo of Florida. His brilliant approach to program writing allows you to tap the real power and speed of your microcomputer, and it is about time this happened.

I interviewed him to find out more about *Quikpro + Plus* and pass this valuable information to you. He told me "The best part of this software is that it gives you a separate custom program every time you use it. The resulting program is produced, error-free, in BASIC (Microsoft Basic/MBasic/Basic 80/Oasis Basic, as appropriate to your system) for you by *Quikpro + Plus*. What's more, you can list your new program, look at it, see what makes it tick, and modify it as you wish."

You can also, customize, enhance, alter, and even copy the programs you create with *Quikpro + Plus*. This is because programs created by *Quikpro + Plus* are structured, easy to follow, and include many REMARKS statements right in the program listing. I don't know of any other software with the flexibility and ease of use I found in *Quikpro + Plus*.

HUNDREDS OF APPLICATIONS...

For Education, Business, Hobby, Home, Science, Personal, etc. a partial list includes programs like these: Financial Forecasting, Expense Planning, Data Access and Retrieval, Modeling, Record Keeping of all kinds, Statistical Data Banks, and much, much more. *Quikpro + Plus* cuts the time it takes to generate a new custom program down to a few minutes. That's true. I saw a letter from a user who created a separate program in Basic within fifteen minutes after reading the clear, simple, complete Documentation & Operating Manual for *Quikpro + Plus*. The software will generate File Handling and Data Entry Programs in a file format, drawn right on the screen by user. Programs created by *Quikpro + Plus* produce standard ASCII Data Files allowing data to be easily accessed by other programs, other micro's, and even main frames.

HOW IT WORKS...

The operation of *Quikpro + Plus* is simple and easy. On your screen you answer questions which appear in plain English. The answers generate error-free Filing & Data Entry Programs for you...instantly. This completely eliminates the tedious and time consuming development you normally go through to write a program. Since the instructions are right on the screen you don't need any programming skills to operate *Quikpro + Plus*. Quickly, you get a fully independent new program ready to run on your system. After you create the new program you can remove *Quikpro + Plus* and stick it on the shelf until the next time you create a custom program.

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You can perform all manner of computations among various fields in each record. You can selectively calculate and print resulting data only, or Data Base and results, or alter Records by calculation results, and so forth. The possibilities seem unlimited. And keep in mind that the power and features I am talking about end up in the separate new custom program *Quikpro + Plus* writes for you.

This software is ready to ship immediately and you can start writing programs the day you get in. In fact, ICR-FutureSoft guarantees your satisfaction or you can return it for a full refund in ten days after delivery. How's that for confidence? Mr. Tamargo said "There isn't any risk to us...our product *works* like it's supposed to work and users are very well satisfied. We are glad to guarantee satisfaction."

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LOGO for the PC

DR LOGO is scheduled to hit store shelves in the third quarter of 1983, but "there's a reasonable chance that the version for the IBM PC might come out as early as June. It's a matter of getting the documentation," said Maysonave. The original equipment manufacturer (OEM) version should be ready by May. DR LOGO hasn't been officially priced yet, but it won't stray far from the cost of Terrapin/Krell LOGO and Apple LOGO (about $150) and probably won't exceed $200. Digital Research plans versions for machines other than the PC, but no delivery dates have been set.

A FULL-SCREEN procedure editor lets the user edit commands before the LOGO interpreter evaluates them.

DR LOGO works with the CP/M-86 operating system; Digital Research's Kildall wrote both. Coincidentally, Digital Research just released a $60 version of CP/M-86 for PC users—the version IBM licensed from them for the PC had been priced at $240, effectively encouraging PC owners to purchase IBM's $40 PC-DOS. Before you rush out and buy the new bargain CP/M-86 in preparation for DR LOGO, note that DR LOGO will already contain a condensed version of the system. The stand-alone CP/M-86 incorporates utilities and amenities not available in the LOGO interpreter package, but enough of CP/M-86 remains on the disk to insure that all files generated in DR LOGO will be CP/M-compatible.

DR LOGO's strength lies in its simplicity and power, enabling beginning users to start programming almost immediately. Its more than 150 built-in functions, called "primitives," cover a range of applications from games to bar charts to list processing. Users can utilize the entire IBM PC memory: up to 100,000 workspace nodes (one node equaling six bytes), or 40 times the workspace available with most LOGO interpreters. To provide this expanded capacity, however, DR LOGO requires 128K of RAM, so many PC owners will need a memory expansion card. Other hardware components you'll need to run DR LOGO

DR LOGO'S HELP facility will show you the name of each LOGO primitive and explain how it is used.

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LOGO Commands

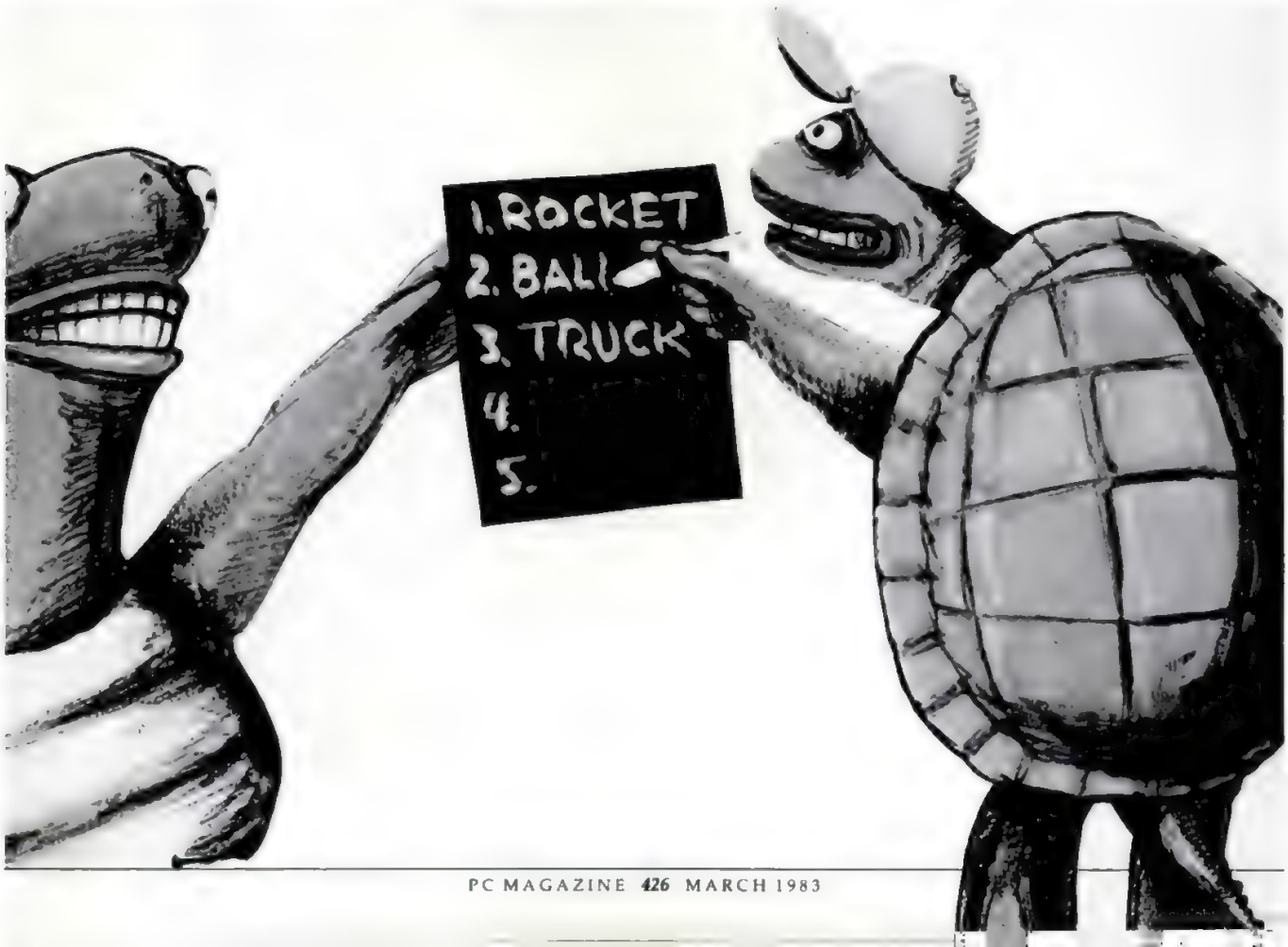
The language's workspace commands provide all the capabilities found in Apple LOGO, as well as several additional capacities that will let programmers debug and cross reference procedures they've constructed. For instance, FOLLOW lets you reorder procedures in your workspace. POTL (Print Out Top Level) looks through the workspace to find all top-level procedures. POCALL (Print Out CALL) shows the procedures as they are nested within one another, and POREF (Print Out REFerences) locates all the procedures that reference another specified procedure. And if you get lost in a welter of procedures and primitives, you can call DR LOGO's Help facility with the primitive POPRIM (Print Out PRIMitives), which will show you the name of each LOGO primitive and explain how it is used.

NEW PRIMITIVES for DR LOGO simplify game writing, string processing, and line editing.

Have you ever written a lengthy, complicated program but found when you returned to debug it that you couldn't remember why you designed a particular procedure as you did? Kildall must have bumped his head against that wall often. In DR LOGO, he provides a special primitive called NOFORMAT that allows you to write extensive comments beside the program as you enter it. Then, after the procedures are recorded, it stores the comments on disk for future reference, freeing up valuable workspace.

Other features of DR LOGO include text windowing, permitting users to interpolate words, commands, or editing instructions wherever desired in a graphics display. Primitives for upper- and lower-case characters and for indentation let the programmer organize his or her procedures more legibly. A full-screen procedure editor lets the user edit commands before the LOGO interpreter evaluates them. New primitives for DR LOGO simplify game writing, string processing, and line editing.

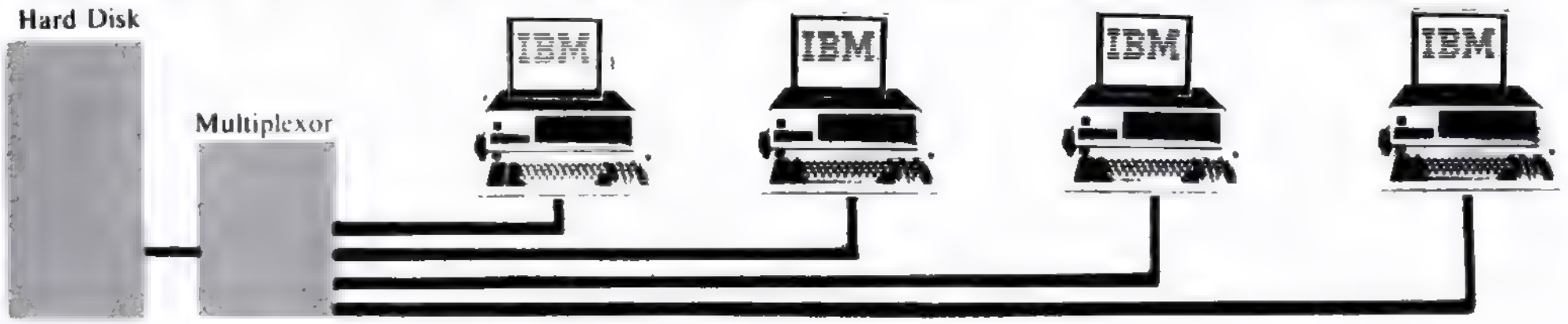
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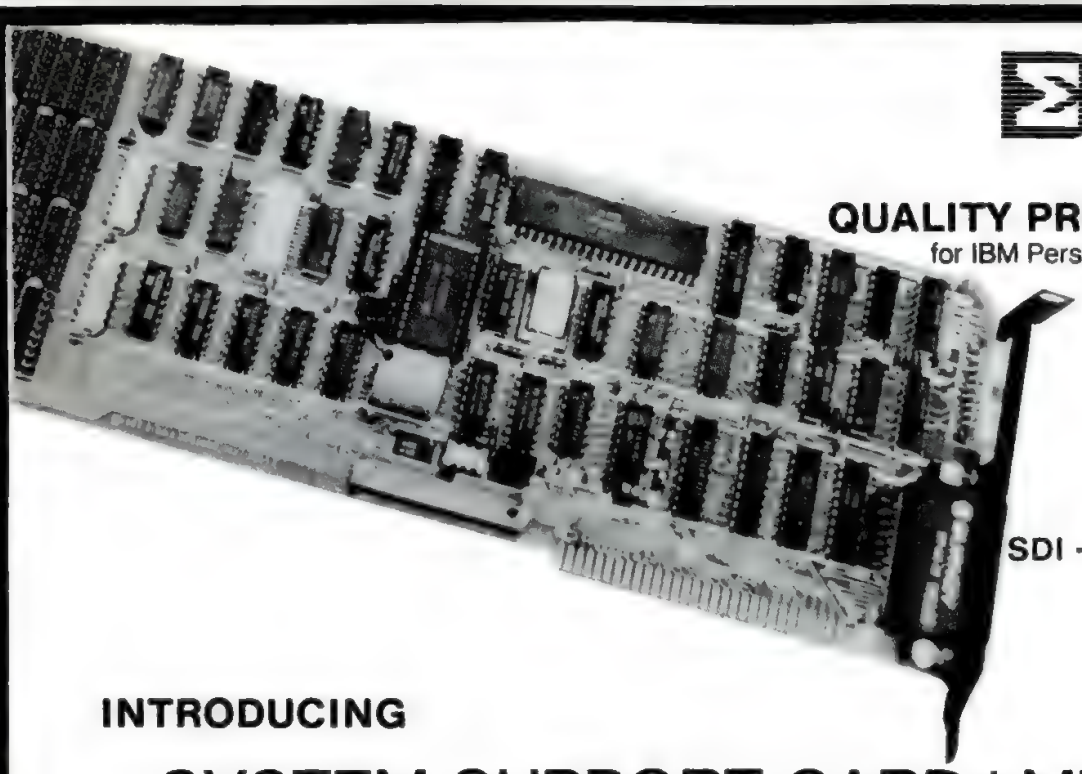
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Graphics for All Ages

Of course, DR LOGO employs the original LOGO's familiar turtle graphics, using the triangular pointer, which leaves a path of color and draws geometric shapes. A cartoon-illustrated tutorial for children and an adult-oriented tutorial instruct users in how to guide the turtle. At the other end of the scale, DR LOGO is upwardly compatible with GSX Graphics, another DR product: GSX extends CP/M's disk-operating capability to control high-level graphics hardware.

In his speech at CP/M'83, Kildall emphasized that DR LOGO had "no floor and no ceiling." Though the language is simple enough for children to use to learn programming, it's flexible and strong enough for advanced business and graphics applications. He described how his son Scott learned LOGO—not through intensive study, but through experimentation and play. Scott's first major project was a home version of Donkey Kong, the popular video game. The boy built the game's characteristic ladders and girders component by component, designing the building blocks, then guiding them into place. "It got him over the threshold of typing a program," said Kildall. With LOGO, children (and other first-time users) can teach themselves to program without math, though they can use LOGO to learn math, geometry, and English. Children can treat DR LOGO like a coloring book, a computerized Etch-A-Sketch, on their way to computer literacy. LOGO grows with the user, he said, while BASIC cannot. One LOGO user in the audience commented that he had used LOGO effectively with third-graders. Kildall added that he felt one could begin as early as preschool.

ANYONE who's never used BASIC finds it easier to use than BASIC.

Despite his glowing vision of DR LOGO replacing BASIC, Kildall wryly admitted he knew there were still a few holdouts. No matter how he tried, he couldn't convince his son Scott to stop programming in BASIC. */PC*

Read more about this language in "LOGO: A Language for Children of All Ages" (PC, Volume 1, Number 8). Digital Research, Inc. can be contacted at P.O. Box 579, Pacific Grove, CA 93950, (408) 649-5500.

Vanessa Schnatmeier is a free-lance writer based in Oakland, California. She is an editor for Her Say, *a women's news service, and has been on the editorial staffs of* Sierra *magazine, BBC Radio news, and* Military Electronics/Countermeasures.

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In the fast-lane world of microcomputers, most products can't seem to achieve much more than "Queen for a Day" status. Osborne's best-selling portable is immediately challenged by the larger-screened Kaypro; *VisiCalc*, *SuperCalc* and a dozen spreadsheet clones square off at high noon; Apple gets upstaged by IBM and comes back with Lisa, while *VisiOn* waits in the wings to wrestle Lisa to the floor. One exception to all this scrimmaging is the unparalleled success of MicroPro International's *WordStar* word processing software, a program that has never really had a serious Avis to play Hertz to. By the time IBM unveiled the 16-bit Personal Computer, *WordStar* was Number One on virtually every eight-bit machine in the business. MicroPro's IBM version quickly became the best-selling word processing program—and according to some sources, the best-selling piece of software—for the PC, despite the fact that IBM itself had thrown its corporate weight behind *EasyWriter*.

WordStar is indeed an awesome program. I've used it myself on the PC since it came out in mid-1982, and I've found it compares favorably with dedicated word processing machines I've written on in newspaper city rooms. But *WordStar* is finally getting a little competition, in fact, a lot of competition. *WordPerfect* is one of a number of second generation IBM word processing programs, written specifically to take advantage of the PC 16-bit capabilities. While it isn't as perfect as its name implies, *WordPerfect* is very impressive, a more than full-featured program with a few truly state-of-the-art goodies tucked into the package.

WORDSTAR is finally getting a little competition.

A Well-Endowed Package

For starters, *WordPerfect* includes (all on one disk, as part of its regular word processing package) several features that would cost hundreds of dollars to add on to *WordStar*. Among these are a merge program for writing form letters; a math program that allows you to do calcula-

Illustration: Don Day

tions within an article or report; a footnote feature that permits footnotes of up to a page in length, and that automatically renumbers footnotes if you insert new ones; and a macro utility that lets you use a few keys to invoke a series of commands or a set of words automatically. This last feature (not unlike the very good ProKey program put out by ProSoft) can be a tremendous timesaver. For example, you can use it to write a mini-program that signs off a letter in a particular way on a particular part of the page:

Sincerely yours,

Joe Van Blow
Executive Vice President

You can then save the mini-program and invoke it with only a few keystrokes every time you write a letter. (The macro and merge features can also be combined during the writing of form letters to do a variety of sophisticated tasks, from inserting boilerplate to sending copies of your work to different printers.)

All of these extras would be nice enough, but *WordPerfect* is also a winner in the regular old word processing department. The program supports soft hyphens, super- and sub-scripts, conditional page breaks, and virtually every other feature that one ought to expect from a higher-priced program. (One exception is split-screen capability, which is included in Mark of the Unicorn's *Final Word*.) *WordPerfect* has search and replace capability (both forward and backward) to locate a particular word or words in a document. Underlining and boldface are shown on your screen the way they'll appear in your printed copy, not with coded commands. When you set up margins and spacing on an article you're working on, the program remembers them; you don't have to set them up all over again the next time you open up the document. This is especially nice if you're simultaneously working on a single-spaced letter with standard margins and a double-spaced article with narrow margins and you want to type them the way they'll appear in print.

MOVING around within WordPerfect is a joy.

THE TEMPLATES are made out of what seem to be cheesy-grade construction paper.

Sounding the S.O.S.

A Help feature, invoked by pressing shift and F3, alphabetically lists all possible commands (advance line, alignment, etc.) and tells you how to do them. It thoughtfully directs you to the place in

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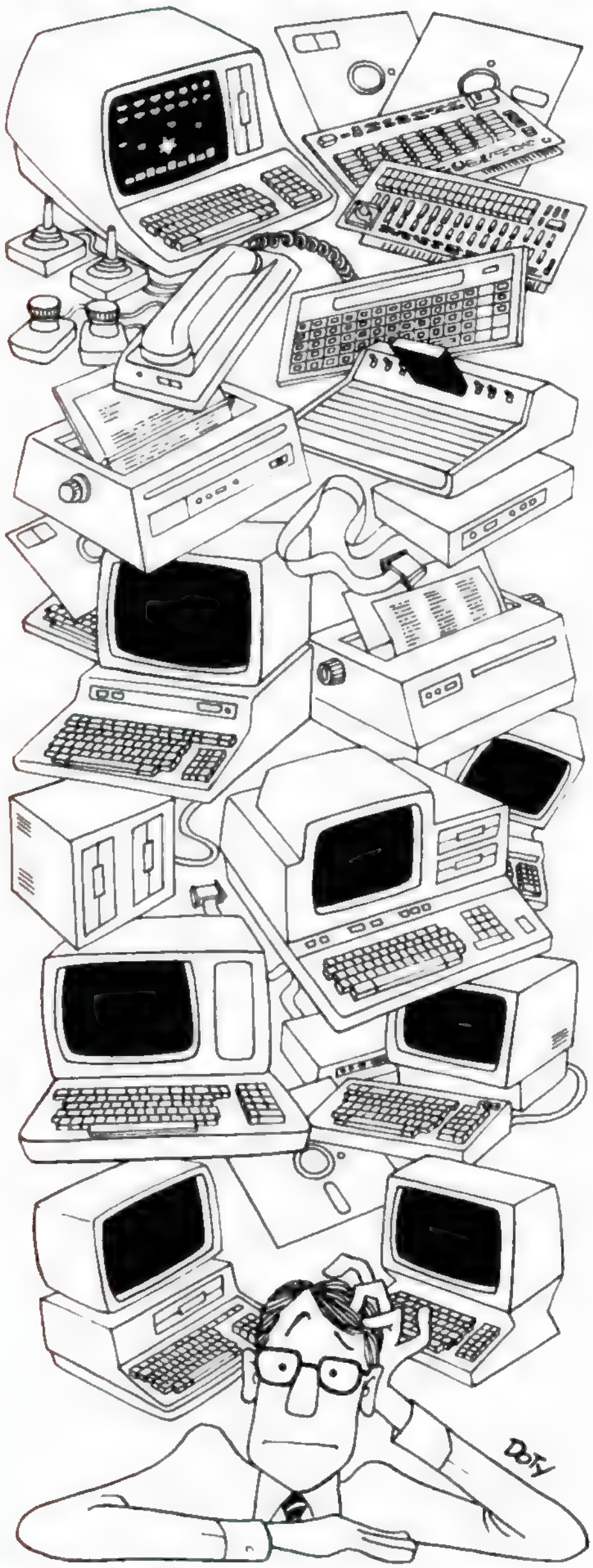
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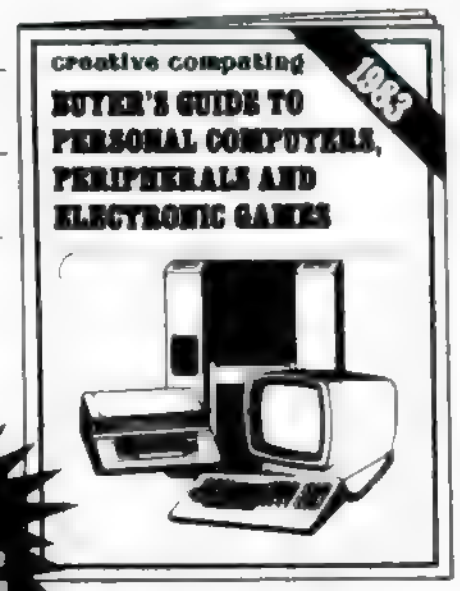
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the manual where you can find more information. You can perform a number of system commands, including checking on disk space, without leaving *WordPerfect*. Formatting is also excellent, eliminating the need for you to make the usual choice between simple-but-limited and sophisticated-but-intimidating. Text can be automatically centered on a page top to bottom, copy can be keyed in flush right (convenient for dating letters), and attributes such as page length, page numbers, headers and footers can be easily set by menu. You can even write your copy in twin vertical "newspaper" columns if you feel the urge.

WordPerfect threw hunks of white stuff between my words like so much squished-up Wonder Bread.

But my personal favorite feature, and one that ought to appeal to other users who compose, rather than copy, text on their computers, is the *WordPerfect* automatic paragraph reform. The bane of my relationship with *WordStar* has been a command called Ctrl-B which is performed by pressing the control and B keys simultaneously. It is a penance I have to perform every single time I go back to rewrite or edit or insert or delete something in an article in order to make all the copy neat again. If I forget—which is a frequent occurrence, since I'm usually concentrating on being a writer, not a typesetter—my paragraph ends up with bombed-out white-space excavations in the middle of lines and words dripping out of the margins like spaghetti slopping over the side of a can. *WordPerfect* does all this cutting and pasting automatically.

To set up the program, you're instructed to place key stickers and templates over the entire top row of keyboard keys, all the function keys, and several other keys. My first complaint about *WordPerfect* is that the templates are made out of what seem to be cheesy-grade construction paper, and they became dog-eared within a few sessions. Since the key sequences are fairly complicated, the manufacturer could have sprung for some plastic templates to nurse users through the learning period.

Naming Your Printer

The first time you use *WordPerfect*, it asks you a number of questions about your printer and other equipment. It supports single-sheet paper feeders and even certain types of feeders with dual paper bins. This was the occasion of my second complaint, although it might not be yours. *WordPerfect* works on a Qume Sprint 5 or 9; a Diablo 1650, 630 or 620; an NEC Spinwriter 5515, 3515, or 7715; the NEC 3550; or an Epson with Graftrax. All other printers, such as my valiant F-10



Starwriter, are considered "line printers." What this meant was that while my printer typed everything, what it typed didn't turn out as pretty as it ordinarily does with *WordStar*. My attempt to justify the type resulted in pock-marked lines. Instead of proportional spacing, *WordPerfect* threw hunks of white stuff between my words like so much squished-up Wonder Bread. My footnotes also failed to superscript and just sat there like regular old numbers. If you care about such things and you don't happen to own one of the specified printers, this program may not be for you. (I later tried to experiment with reinstalling my printer as an NEC 3550, since both that printer and mine run under the same *WordStar* printer installation—but it didn't work.)

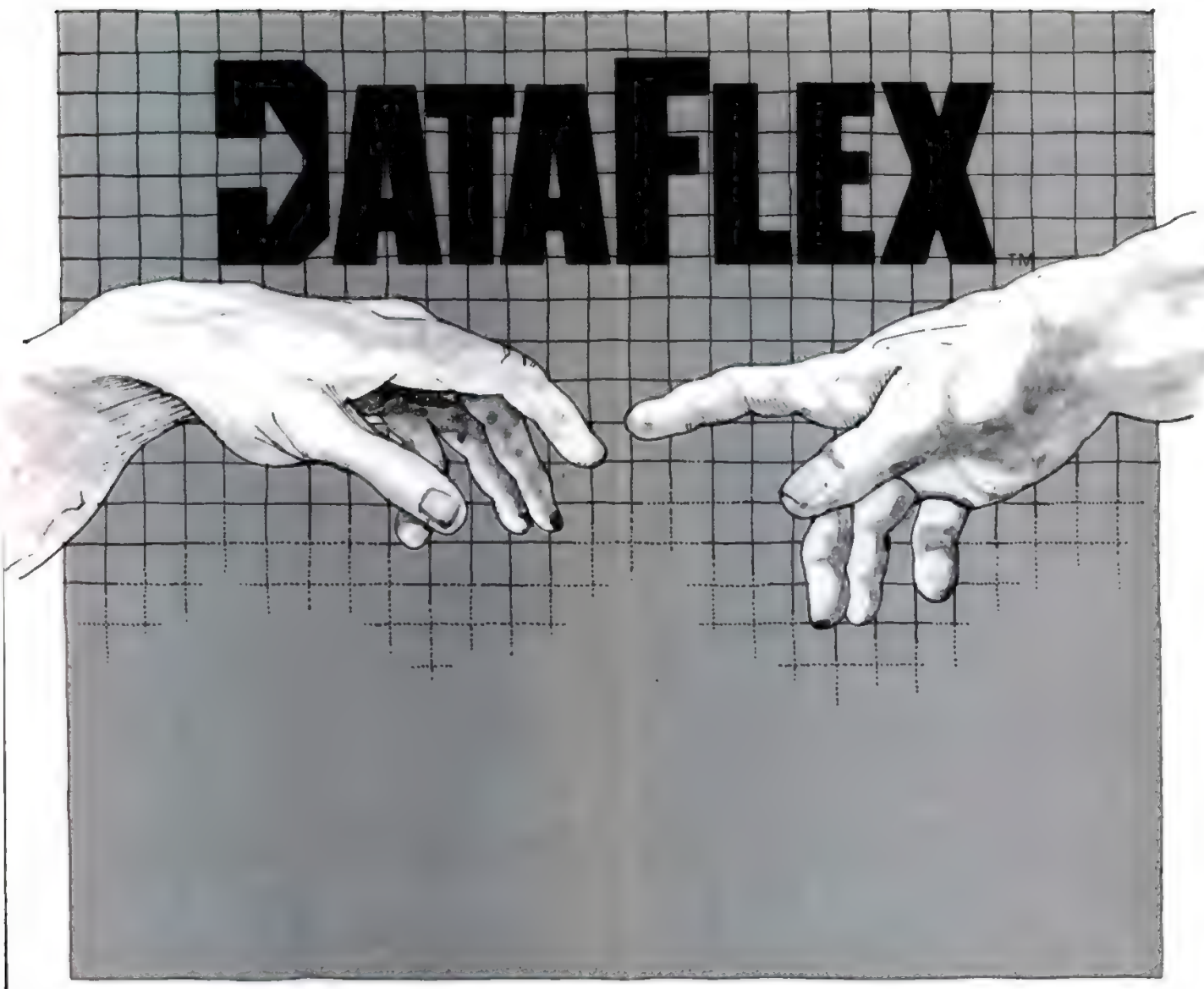
My third complaint came when I tried to run the *WordPerfect* "Preview" tutorial program. At least, I think it's a tutorial. On my disk, the program simply ground to a halt after a few screenfuls of what appeared to be pretty unhelpful hints. For example, Preview grandly announces the fact that it can underline, but it doesn't tell how to do it. On the other hand, the accompanying manual—in the de rigeur IBM-style 8- by 9½-inch looseleaf—is a model of good organization and clarity. Instruction is divided into four levels of ascending difficulty, and each command includes learning exercises. My only criticism was the index, which is limited to entries corresponding to the names that the manufacturer has given each command. Thus, if you want to look up how to format your text into newspaper columns, you won't find it under "newspaper" or "columns"; it's under "text columns." (In real life, of course, you'll end up looking through the whole manual.) The manual also includes a page called "HELP—if you press a wrong key," which provides numerous suggestions for extricating yourself from the kinds of problems that most of us tangle ourselves up in when we're learning word processing.

I did manage to crash *WordPerfect*, by attempting to print out a *WordStar* file. The whole screen literally froze—I couldn't even move the cursor. Luckily, the program isn't copy-protected, and I had made a back-up.

In some cases, WordPerfect makes it more difficult than necessary.

A Blank Beginning

Upon booting, you're confronted not with a series of menus, but with a near-blank screen. In the bottom right-hand corner is a pristine little status line, telling you your page, line, and column numbers. This uncluttered spareness is offset by a *WordPerfect* tendency that others may appreciate but that threatened to



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drive me up the wall. Whenever you "key in" to any of a number of command modes—underlining, boldface, flush right, columns, etc.—if you go back a bit to change a word, a flashing sign pops up on the lower left hand of the screen and demands to know whether you in fact want to delete whatever it is you're changing. It keeps after you until it gets a yes or no answer, and if there's a way to disable it, I couldn't find it.

Moving around within *WordPerfect* is a joy. There are more options than I have space to detail, but a few examples should give you an idea. Press "page up" and "page down" and you get just that, the previous or following page of your document. Press the minus and the plus on the numeric keyboard and you'll get screen up or down. Still another option is Control/Home, followed by the number of the page you want to go to. The home key used with any of the four arrow keys puts you at the top or bottom of your screen, or at the beginning or end of your line. Two homes and a press of the up or down arrow key gets you to either the top or the bottom of the article you're working on. Other commands allow you to delete letters (forward and backward), words, lines and pages. These cursor moves have a certain internal logic, and they are easier to learn than the equivalent *WordStar* keystrokes.

The other keystroke commands are a different story. Unlike *WordStar*, whose commands all involve the control key and then either one or two letters, usually bearing some relationship to the command itself (s for save), *WordPerfect* commands must be memorized. One set of commands involves function keys; another, the shift key and the function keys; and still others involve either the control or the alternate key and the various number keys along the top of the keyboard. None of these is set up in ways that are easy to remember, and in some cases, *WordPerfect* makes it more difficult than necessary. For example, the templates are set up so that next to, say, the F6 key, it reads:

```
Set Format
Bold
```

The top command—a menu of different tab, margin, spacing, and hyphen options—is invoked by pressing F6 and the shift key; the bottom command, for boldfaced printing, is invoked merely by pressing the function key. My own intuition after 20 years of typing was that the bottom function ought to be the one requiring the shift key. I constantly screwed up all the shift/function commands, even with the template staring at me.

MY OWN intuition after 20 years of typing was that the bottom function ought to be the one requiring the shift key.



Reaching for the Buffer

Block moves were also a little confusing to learn, but well worth the trouble. *WordPerfect* features a buffer, so that when you delete a block, you can change your mind and get it back again, at least until you put something else into the buffer. The problem is that once you've told the program that you want to move something, it asks you if you want to "cut" or "copy." The correct answer is "cut," which removes the block from the screen and puts it into the buffer until you enter the menu command to retrieve it. The seemingly more sensible "copy" lets you move your block, but you'll have a duplicate block in the old location. If you want to delete the block rather than moving it, you simply leave it in the buffer and forget about it. I found it exasperating to press the "cut" menu option when I wanted to move and the "move" mode key (Alternate 9) when what I wanted to do was cut. It would seem that a program as command-rich as this one could have figured out a way to perform these functions separately.

IF YOU'RE a new PC owner who's scouting around for a top-of-the-line program, check this one out.

Another feature that some may like and others will hate: *WordPerfect* doesn't automatically back up a file. *WordStar* does, which is nice for security, but it means that on a single-sided 160K disk, you can never have a file of more than 80K—the original file plus the automatic back-up.) I prefer the *WordPerfect* system myself. In any case, it's a simple matter to back up disks on this program if you desire.

A similar, often-heard gripe about *WordStar* is that you can lose all your work if you fill up a disk and the program can't save your current copy. There's no option to exit to the system to erase other, less-needed files on the same disk or to put a blank disk in the B drive. *WordPerfect* does let you exit without having work disappear into the computer void. I once lost the better part of a magazine article to the deadly jaws of *WordStar* this way, and so I tend to feel strongly about it.

WordPerfect, in short, is a real find, despite its faults. I don't think I'd recommend it to someone who's already bought and learned *WordStar*, unless, of course, he or she is a fanatic hater of the Ctrl-B command. But if you're a new PC owner who's scouting around for a top-of-the-line program with good documentation and almost every bell and whistle in the book, check this one out. */PC*

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1200 Baud: Speed of Choice for PC Communications

With the introduction of the IBM PC came widespread recognition from corporate data processing managers that there was a place in the modern office for personal computers and electronic work stations. But the effective use of such systems required the marriage of computers and communications.

Corporate computer users often need to communicate with other PCs and with existing minis and mainframes. IBM certainly recognized this; one of the few add-ons available at the time of the initial PC announcement was an RS-232 asynchronous serial adapter and its asynchronous communications support package.

IBM subsequently updated the Async package with version 2.0 while adding 3101 terminal emulation. New synchronous communications support has come by way of synchronous data link control (SDLC) adapter hardware and 3270 terminal emulation software. The clear signal is that IBM views the PC as a communications machine.

IBM VIEWS the PC as a communications machine.

Applications Point the Way

Corporate customers have varying communications requirements. A large brokerage/investment firm, for example, may have hundreds of branch offices and several thousand brokers spread across the country. To achieve faster response to customer inquiries and increase productivity, brokers need up-to-the-minute market quotations at their desks. The solution is IBM PCs equipped with RS-232 adapters and auto-dialing modems. Since each broker needs a work station, the per-station cost should be low. However, transmission time must be short to minimize "blocking" (when all access lines are busy) at the central database computer. The modem speed is automatically determined from the application requirements. Most modems run at 1200 baud.

In another case, a large manufacturing company sells its products through a network of 10,000 independent, single-line dealerships. Daily sales are entered by item into each dealer's PC. A running inventory of both large and small items is maintained by the computer. The PC is equipped with an auto-answer/auto-dial modem, allowing the manufacturer's central computer to poll the PC during the night. Orders are generated automatically from the dealer's inventory levels, allowing the dealer to concentrate more effort on sales rather than business management. The dealer also has access to manufacturers' specialized analysis programs, which help pinpoint potential problem areas such as cash management, overhead costs, and sales trends. The dealer may also profile the business to measure performance relative to other dealers. Since the central computer must poll such a large number of dealers every night, 1200-baud auto-dialing modems have to be used to minimize the number of WATS lines at the central site. 300 baud is unacceptably slow.

1200 BAUD modems can theoretically reduce connect-time by 75 percent, resulting in significant savings.

The decreasing price of main memory coupled with the large 1 megabyte address space has fostered a trend toward larger programs and data files for the PC

rather than for Z80 equipment. As phone bills rise, connect-time costs with 300-baud modems can quickly become excessive. 1200-baud modems can theoretically reduce connect-time by 75 percent, resulting in significant savings.

While market forces create the need for faster modems, advances in technology promise to reduce their manufacturing costs. As a result, most modems installed on the PC will likely be 1200-baud, Bell 212-compatible units. Nearly all second-generation 1200-baud modems will be microprocessor based and will provide a simple interface necessary for office applications. Modem designers will follow the lead of computer designers and work to eliminate most control switches and lamps from the front panel. This will result in greater acceptance of modems by nontechnical office personnel.

Economics of 1200-Baud Modems

Faster modem speed requires additional circuitry to implement its more complex modulation method. Modems can be evaluated on a cost effectiveness basis. Paying "a buck a baud" is the traditional rule-of-thumb used by seasoned data processing managers, but a more precise calculation is possible. For example, a popular 300-baud modem sold in computer stores retails for $289, giving 96¢/baud. A high-performance 1200-baud equivalent sells for about 75¢/baud. 1200-baud 212 modems may have already surpassed 300 baud on a price/performance basis, but this is only one of two key economic factors. The other is "threshold price," the psychological level where enough additional value is perceived to cause serious users to switch from 300 to 1200 baud.

In 1982, market forces displaced the more costly VA3400 protocol in favor of

History of the 1200-Baud Modem

In the computer age, a great idea commands attention for just a few years before another great idea comes along.

Half-duplex 1200-baud modems (which communicate in only one direction at any given time) have been available since the late fifties. In 1972, John Bingham of the Vadic Corporation designed the first 1200-baud full-duplex modem capable of long distance transmission over standard telephone lines. The resulting VA3400 product was first marketed in 1973. Over a period of years, Vadic built a significant base around the "3400 standard," primarily among timesharing companies and their customers. Even though a few other modem companies developed incompatible proprietary designs, only Vadic was able to achieve a significant base.

In 1977, however, the 1200-baud modem industry was surprised by Bell's announcement of the model 212A. Unlike the 3400, the Bell 212A used carrier frequency assignments similar to the 300-baud Bell 103, making the 3400 and 212 fundamentally incompatible. With Bell's size and marketing influence, the 212 quickly surpassed the 3400. When applied to the Bell 212, this technique requires a symbol rate of only 600 symbols/second, allowing reliable communication over limited bandwidth telephone lines.

A number of second sources for the 212 subsequently emerged after Western Electric went into production with the unit. The second-sourcing occurred because Western was barred by a 1956 Consent Decree from selling its equipment to the public. By 1982 many vendors, including Vadic, had jumped on the 212 bandwagon, attesting to the clout of Bell, and the market's desire for uniform compatibility. —*ME*

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Inside the Bell 212A Standard

A short, technical explanation of 1200 baud communication over voice-grade telephone lines.

Although vendors might add, change or delete the *A* suffix, the *212* standard refers to a modulation/encoding scheme to accomplish full-duplex 1200-baud communication over ordinary telephone lines.

Simple Bell 103-style modems make use of a pair of tones (2225 Hz and 2025 Hz) distinguished by frequency to represent the two bits 0 and 1. The faster, but more complicated 212 standard uses four phase changes of a constant audio carrier (2400 Hz) to represent the four possible two-bit groupings (called "dibits") 00, 01, 10, 11.

The necessity of designing a more complicated, more costly system arises because of the limited frequency response, or fidelity, of the telephone network. The combined techniques of grouping bits into dibits and changing carrier phase rather than frequency allows reliable, simultaneous, bidirectional 1200 baud communication over voice-grade lines.

The four different signal possibilities are called "symbols" in communications jargon. Bell's 212 standard encodes two bits of data into one symbol. The time bin occupied by a given symbol is known as a "chip."

To illustrate the encoding process, suppose we had four symbols: an orange (00), a grape (01), an apple (10) and a banana (11). Before transmission begins, we agree on the symbol-to-dibit encoding. We also agree that I (being the transmitter) will hold all four symbols behind my back, pulling out one to show you (the receiver) each second. I will, of course, return the previous symbol behind my back.

Now, over a 5-second interval, suppose I show you the symbol sequence: orange, grape, orange, apple, banana. You, in turn, correctly decode this symbol sequence as 0001001011, effectively communicating 10 bits of information in only five seconds. Because bandwidth consumption is proportional to symbol rate (not bit rate), the bandwidth requirement is halved by this encoding. —*ME*

the Bell 212 protocol. This trend toward increased standardization helped increase volume, causing 212 modem prices to decline. A complete, auto-dialing, auto-log-on 212 was still relatively expensive in 1982. However, new modem technology will allow 1200 baud production costs to drop. The savings should be passed along to the consumer, causing a huge increase in 1200 baud demand by PC owners, and overwhelming adoption of Bell 212 protocol as the standard for PC communications.

COSTS FOR modem hardware will soon drop to a point where 80 percent of the prospective buyers can afford a 212 compatible unit.

Modems as LAN Transceivers

One of the most practicable local area network (LAN) architectures is based on a private branch exchange (PBX). This is of special interest to American corporations, which generally own or rent PBX equipment, and may become large users of the PC.

There are several important advantages to the PBX-based LAN. Node switching is already accomplished by the PBX. No new cabling or dedicated hardware need be installed to implement the LAN. And because PBX switching facilities and communications lines are already in place, the incremental cost to implement the LAN is low.

Tying the PC into the PBX with an auto-dialing, auto-answer, 212-type modem provides sufficient horsepower for the two most common applications: electronic mail and central data base access. These generally do not involve volume data transfer, and are well suited to 1200-baud modem use. An added economic advantage is that LAN growth is incremental in nature with essentially no fixed start-up cost. Extra nodes simply require an additional modem/communications software package tied into the existing PBX phone network.

WHAT IS NOW needed is a standard for asynchronous communications.

Future of 1200 Baud

This year we will see the emergence of lower cost, advanced function 212-type modems. This will stimulate 1200-baud modem use on the PC. Costs for modem hardware will soon drop to a point where 80 percent of the prospective buyers can afford a 212 compatible unit.

Standardization of the communications interface will become even more important with the expected large-scale installation of PCs in corporate offices. Because of Bell's considerable marketing strength, the Bell 212 is currently the industry hardware standard, a position it will probably retain.

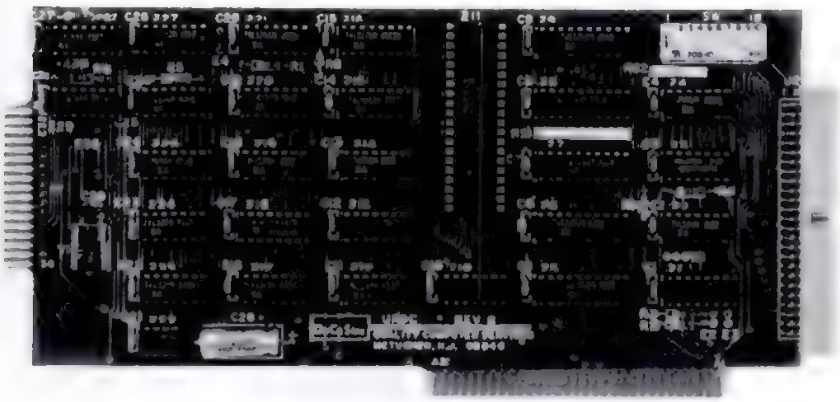
What is now needed is a standard for asynchronous communications equivalent to the bisync protocol used for synchronous communication. IBM protocols currently dominate synchronous transmission. In the interest of standardization, I would like to see asynchronous file transfer follow the format used in version 2.0 of IBM's asynchronous communications support package. If this format is adopted, all communications software could communicate regardless of application or vendor.

The days of 300-baud modems are not yet gone. But 300-baud usage will be increasingly relegated to consumer home computers, while business-oriented computing embraces 1200-baud modem. And the IBM PC will lead that trend. */PC*

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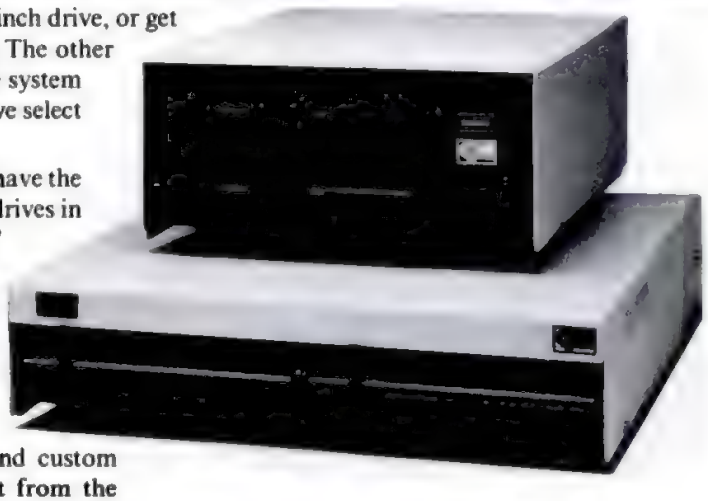
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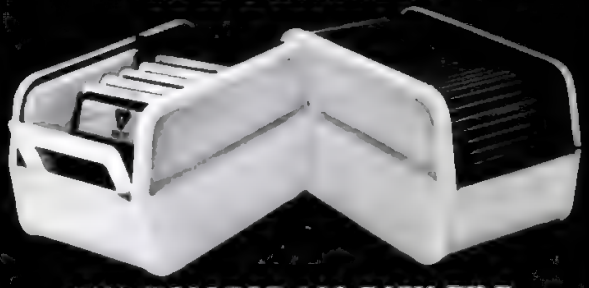
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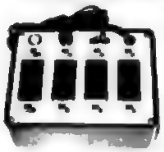
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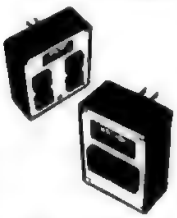


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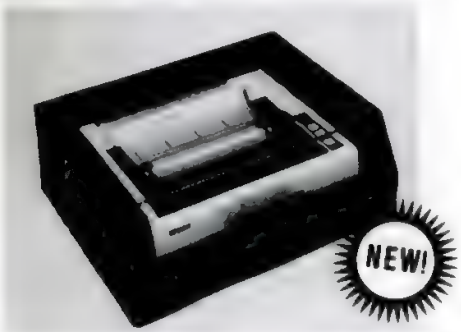
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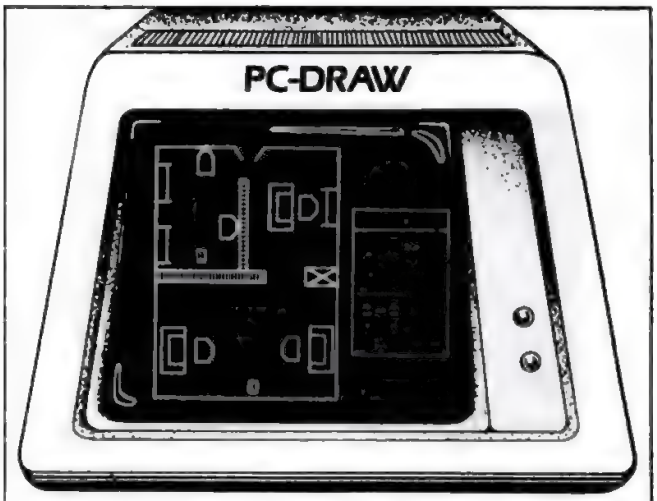
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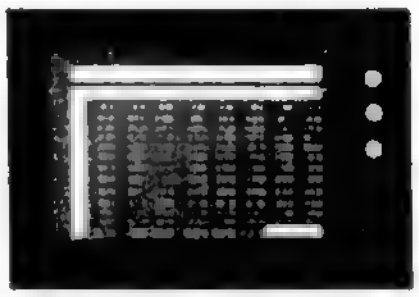
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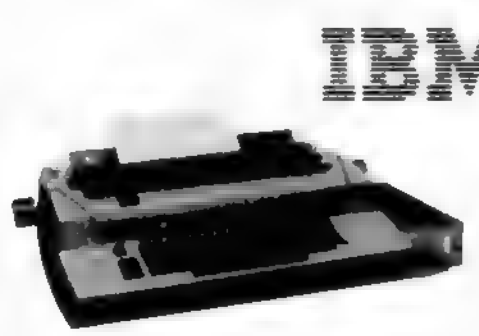
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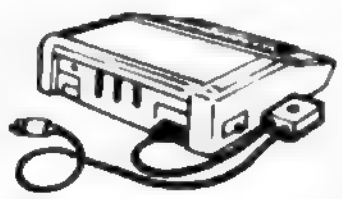
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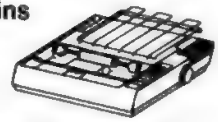
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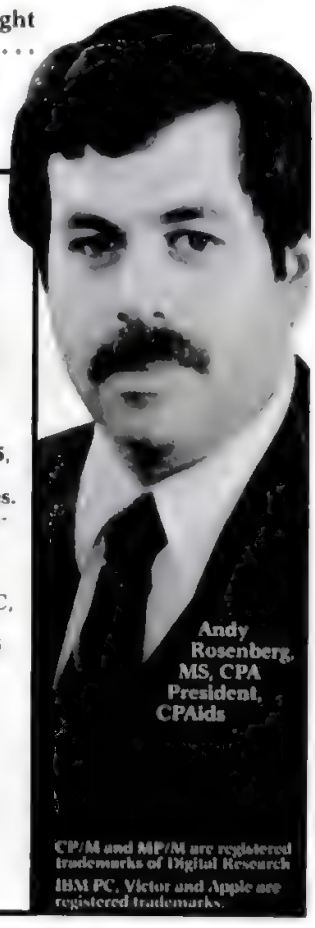
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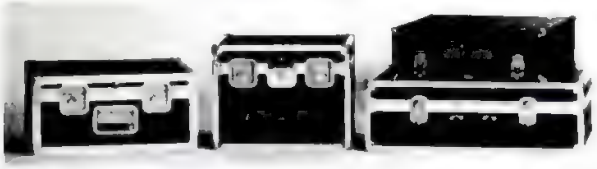
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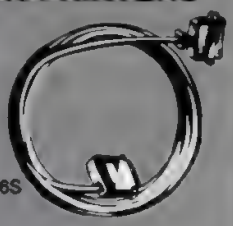
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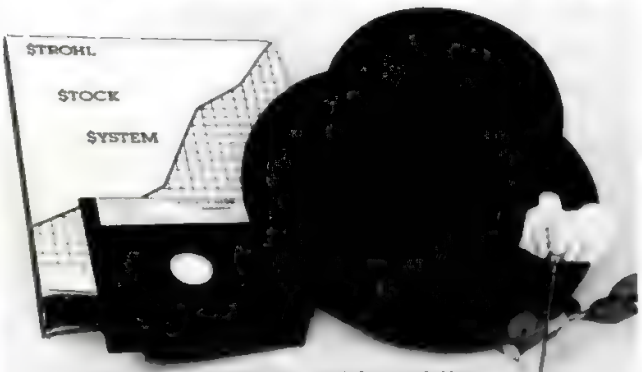
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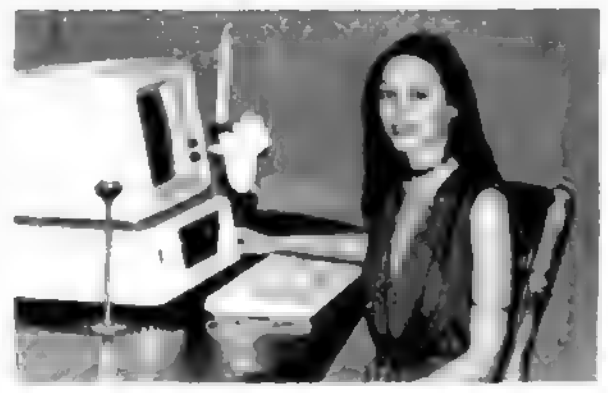
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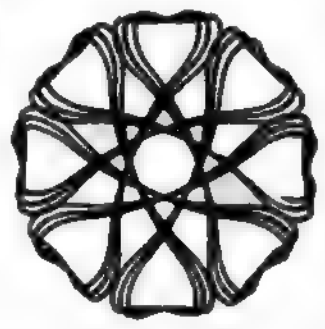
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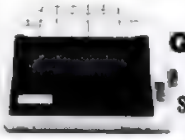
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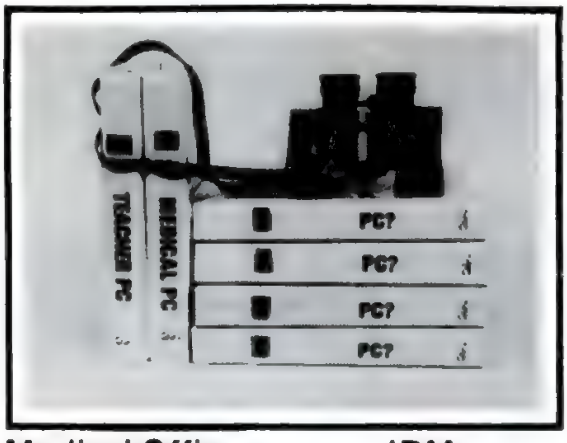
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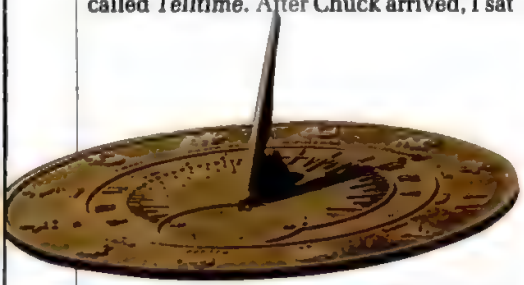
Digital clocks are not enough: A simple program helps revive the familiar rite of big hands and little hands.

Learning To Tell Time With Telltime



Young Chuck Wilder was having trouble learning to tell time the conventional way. And no wonder: All the clocks and watches around his house are digital. Interpreting the relative positions of the big hand and little hand may not be the crucial skill it once was, but it's a traditional rite of passage. Its successful completion rewards the novice with enormous satisfaction and a powerful sense of self-confidence. Remember?

Learning to read a round-faced clock seemed important, especially since the novice was my nephew. Before he came to visit last summer I designed a program called *Telltime*. After Chuck arrived, I sat him down in front of our IBM PC and booted it up. Once he found that it was a very patient and friendly teacher, he spent hours at the computer. In a few days Chuck mastered analog clocks. Other children have also tried *Telltime* with the same success.



Inside Telltime

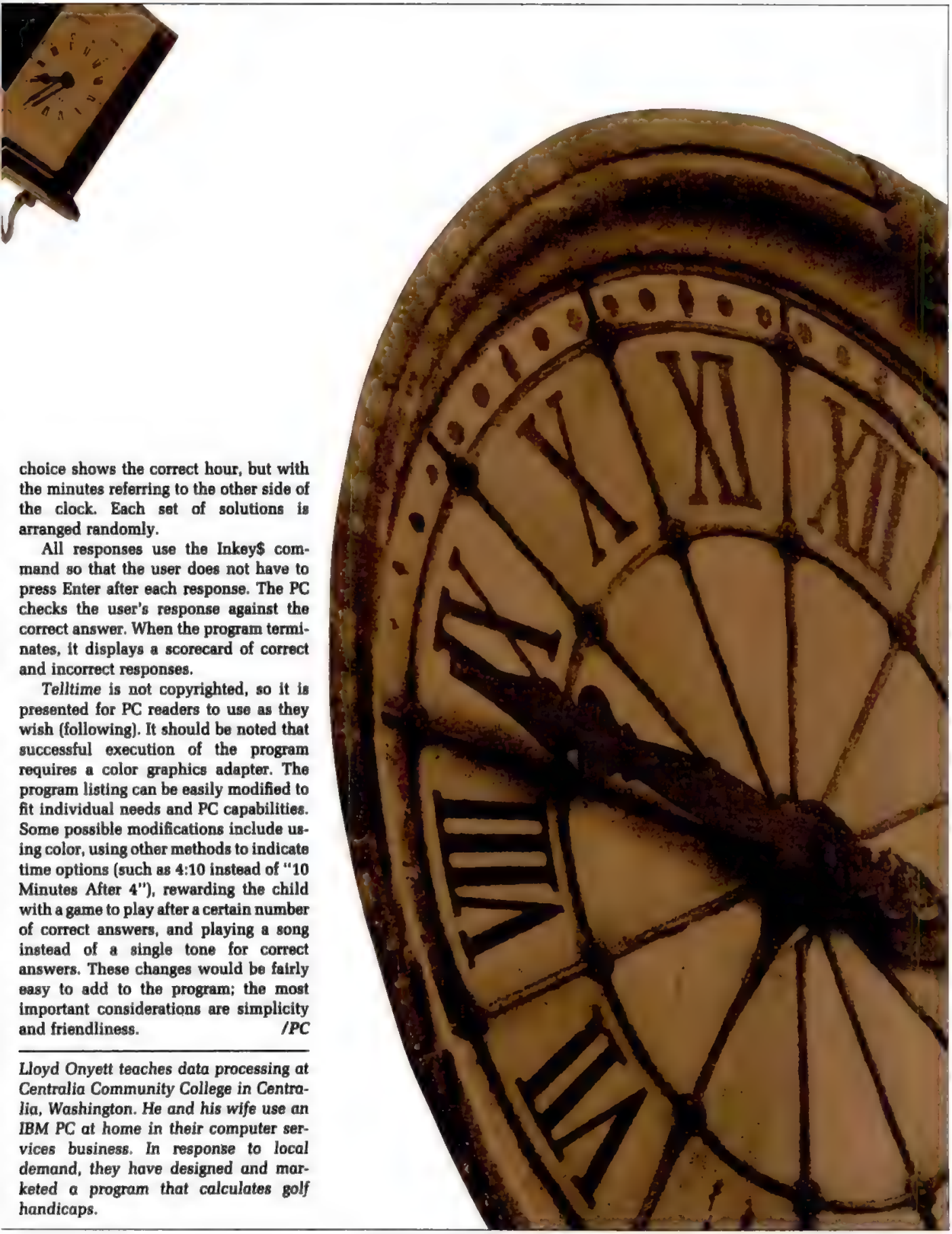
Telltime displays a clock on the monitor. It represents time with hour and minute hands. The program asks the child to choose the correct time from three options. If he or she selects the correct response, the clock turns into a happy face with superimposed eyes and a smiling mouth. The PC emits a pleasant tone and the monitor displays "Right Answer," for 5 seconds. If the child chooses an incorrect answer, the clock turns into a sad face, the computer emits a disapproving tone, and the monitor displays the message, "Wrong Answer, The Correct Answer Is _____." The frowning clock remains on the monitor for 10 seconds, allowing the child to review the answer before the next problem appears.

Telltime uses the random number routine to select clock times. All graphics and text are drawn in medium resolution to provide larger print for children. The program incorporates the BASIC Circle command to draw the clock. The hour and minute hands are drawn using the arc (ellipse) option of Circle with connections to the center of the clock. *Telltime* adjusts the hour-hand angle to compensate for the location of the minute hand. If, for example, the minute hand points to 12, then the hour hand points directly to the hour, but for any other setting of the minute hand, the hour hand moves past the hour.

The monitor presents three possible answers after displaying the clock. For example, if the clock shows 4:10, the monitor displays "10 Minutes After 4," "20 Minutes After 3," and "10 Minutes To 4." The first choice is correct, of course. In the second case, the minute and hour hands are reversed. The third

```
100 '  *-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-*
110 '  =                                                           =
120 '  =              **** TELLTIME ***                            =
130 '  =                                                           =
140 '  =          Written by Lloyd Onyett                          =
150 '  =                                                           =
160 '  =           Chehalis, Washington                            =
170 '  =                                                           =
180 '  *-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-=-*
190 '
```

continued on page 462



choice shows the correct hour, but with the minutes referring to the other side of the clock. Each set of solutions is arranged randomly.

All responses use the Inkey$ command so that the user does not have to press Enter after each response. The PC checks the user's response against the correct answer. When the program terminates, it displays a scorecard of correct and incorrect responses.

Telltime is not copyrighted, so it is presented for PC readers to use as they wish (following). It should be noted that successful execution of the program requires a color graphics adapter. The program listing can be easily modified to fit individual needs and PC capabilities. Some possible modifications include using color, using other methods to indicate time options (such as 4:10 instead of "10 Minutes After 4"), rewarding the child with a game to play after a certain number of correct answers, and playing a song instead of a single tone for correct answers. These changes would be fairly easy to add to the program; the most important considerations are simplicity and friendliness. */PC*

Lloyd Onyett teaches data processing at Centralia Community College in Centralia, Washington. He and his wife use an IBM PC at home in their computer services business. In response to local demand, they have designed and marketed a program that calculates golf handicaps.

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```
200 '   *** Setup ***
210 '
220 DEFINT A-Z:DEFSNG P
230 KEY OFF:SCREEN 1,0,0,0:COLOR 0,1
240 PI=3.141593
250 RANDOMIZE VAL(MID$(TIME$,7))
260 '
270 '   *** Randomly selects time to draw ***
280 '
290 HR=RND*12 MOD 12+1
300 MIN=(HR+RND*11 MOD 11)MOD 12+1
310 '
320 '   *** Draw graphics ***
330 '
340 CLS
350 CIRCLE (230,100),2,3
360 CIRCLE (230,100),80,1
370 H=(15-HR)MOD 12
380 HANGLE!=H*-2*PI/12+(MIN+12*(MIN>6))*PI/72
390 IF HANGLE!>0 THEN HANGLE!=HANGLE!-2*PI
400 CIRCLE (230,100),50,1,HANGLE!+.02,
    HANGLE!-.02
410 M=(15-MIN)MOD 12
420 MANGLE!=M*-2*PI/12
430 CIRCLE (230,100),70,2,MANGLE!+.02+2*PI*
    (M=0),MANGLE!-.02
440 '
450 '   *** Print title of program and
    numbers on face ***
460 '
470 LOCATE 2,17:PRINT "TELLTIME"
480 LOCATE 4,29:PRINT "12"
490 LOCATE 5,24:PRINT "11":LOCATE 5,35:
    PRINT "1"
500 LOCATE 9,19:PRINT "10":LOCATE 9,39:
    PRINT "2"
510 LOCATE 13,19:PRINT "9":LOCATE 13,40:
    PRINT "3"
520 LOCATE 17,20:PRINT "8":LOCATE 17,39:
    PRINT "4"
530 LOCATE 21,24:PRINT "7":LOCATE 21,35:
    PRINT "5"
540 LOCATE 22,30:PRINT "6"
550 '
560 '    *** Randomly arranges the time
    choices ***
570 '
580 C=RND*3 MOD 3+1
590 CH(C)=HR
600 CM(C)=MIN
```

```
610 D=(C+RND*2 MOD 2)MOD 3+1
620 CH(D)=MIN
630 CM(D)=HR
640 E=6-C-D
650 CH(E)=HR
660 CM(E)=12-MIN
670 IF CM(E) MOD 6=0 THEN CM(E)=CM(E)+6
680 '
690 '   *** Print three possible answers ***
700 '
710 LOCATE 6,1:PRINT "What time is it?"
720 FOR J=1 TO 3
730 LOCATE J*4+6,1
740 PRINT "("CHR$(64+J)")";
750 GOSUB 1290
760 NEXT
770 LOCATE 24,4:PRINT "Hit Key A, B, or C.
    (X to STOP)";
780 RESP$=INKEY$:IF RESP$="" THEN 790
    ELSE 800
790 FOR A=1 TO 300:NEXT:SOUND 18000,.03:
    GOTO 780
800 LOCATE 24,1:PRINT SPC(39);
810 ANS=(ASC(RESP$) OR 32)-96
820 IF ANS=24 THEN 1410
830 IF ANS>0 AND ANS<4 THEN 950
840 '
850 '   *** Unacceptable input rejected ***
860 '
870 LOCATE 24,1:PRINT "   A, B, or C, PLEASE";
880 FOR J=1 TO 6
890 SOUND 50*(J MOD 2+1),5
900 NEXT
910 GOTO 770
920 '
930 '   *** Acceptable input, draw eyes and
    mouth ***
940 '
950 CIRCLE (200,85),20,1-(ANS<>C),3*PI/8,5*
    PI/8
960 CIRCLE (260,85),20,1-(ANS<>C),3*PI/8,5*
    PI/8
970 IF ANS=C THEN 1120
980 '
990 '   *** Wrong answer routine ***
1000 '
1010 SOUND 40,40
1020 CIRCLE (230,200),80,1,(3*PI/8),(5*PI/8)
1030 LOCATE 23,1:PRINT SPC(6)CHR$(ANS+64);"
     IS WRONG"
```


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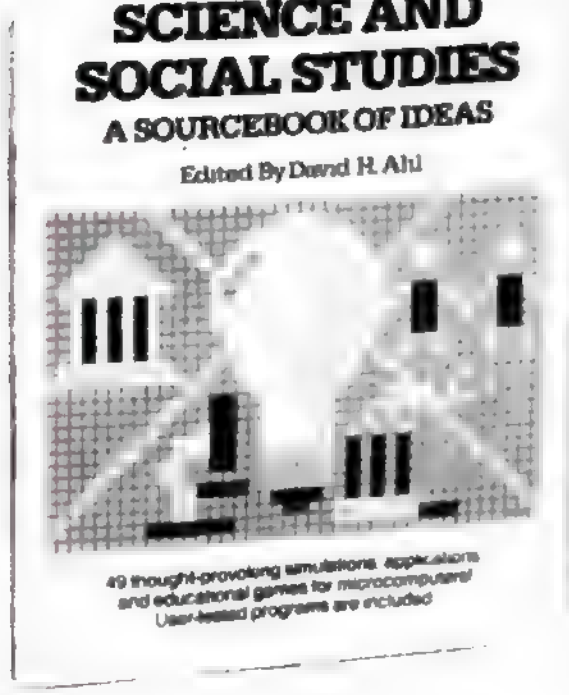
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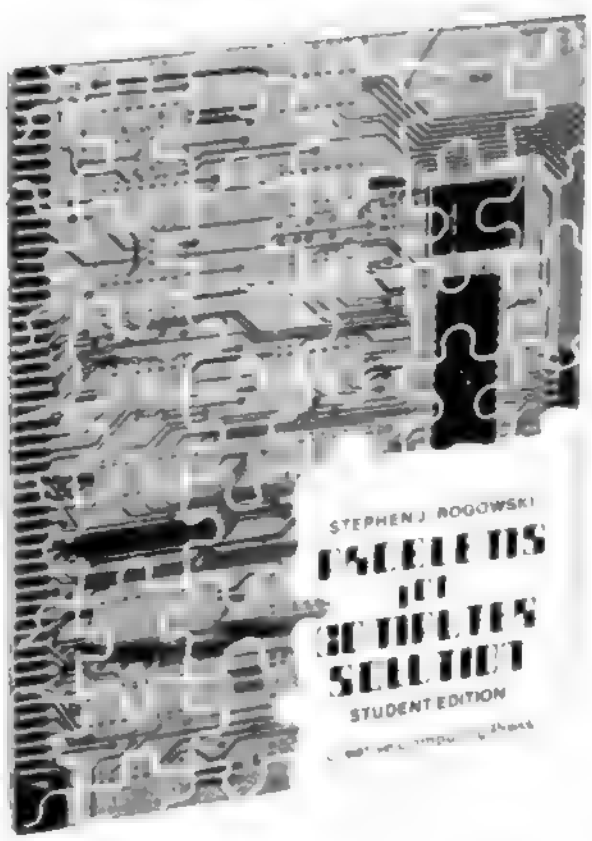
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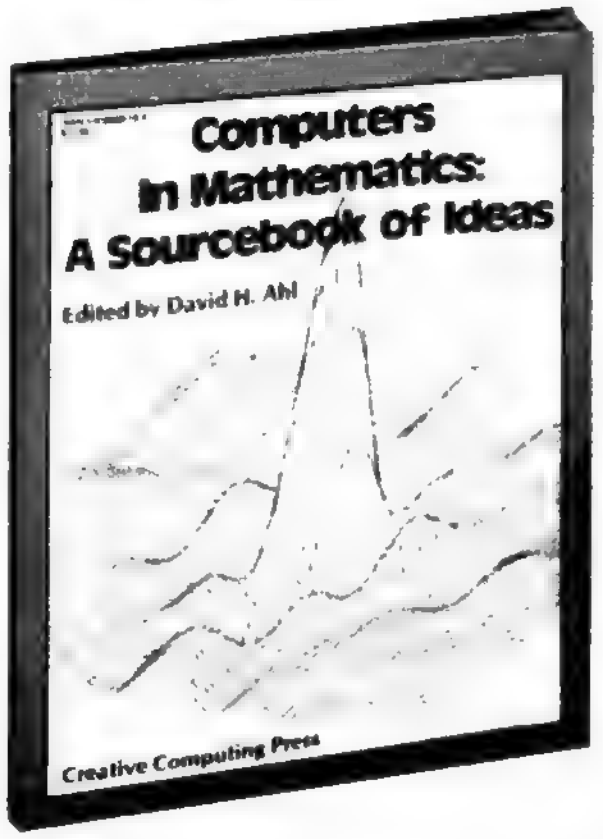

```
1040 PRINT "THE CORRECT ANSWER IS ";
     CHR$(64+C);
1050 FOR J=1 TO 4000
1060 NEXT
1070 NUMWRONG=NUMWRONG+1
1080 GOTO 290
1090 '
1100 '    *** Right answer routine ***
1110 '
1120 LOCATE 24,1
1130 J=0
1140 FLG=0
1150 PRINT "CORRECT!!!!";
1160 CIRCLE (230,100),50,2,(10*PI/8),
     (14*PI/8)
1170 FOR J=1000 TO 4000 STEP 80
1180 SOUND J,.04
1190 NEXT
1200 FOR J=1 TO 2000
1210 NEXT
1220 NUMRIGHT=NUMRIGHT+1
1230 GOTO 290
1240 '
1250 '    *** Time printing subroutine ***
1260 '
1270 IF CM(J)=12 THEN 1340
1280 IF CM(J)<7 THEN CM5(J)=CM(J):CONNECT$=
     "AFTER" ELSE CM5(J)=12-CM(J):CONNECT$=
     "TO"
1290 CM5$=STR$(CM5(J)*5)
1300 PRINT RIGHT$(CM5$,LEN(CM5$)+FLG);
     " MINUTES ";
1310 IF NOT FLG THEN PRINT:PRINT SPC(5);
1320 PRINT CONNECT$;CH(J);
1330 GOTO 1350
1340 PRINT CH(J);"O'CLOCK ";      '2
1350 RETURN
1360 '
1370 '    *** Ending program ***
1380 '
1390 IF NUMRIGHT<NUMWRONG THEN 1410
1400 LOCATE 23,1:PRINT "Very good, you
     answered":GOTO 1420
1410 LOCATE 23,1:PRINT "Too bad, you
     answered"
1420 PRINT NUMRIGHT;"right and";NUMWRONG;
     "wrong.";
1430 LOCATE 1,1
1440 END
```

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IBM EYE/KATHLEEN BURTON

As the information processing market heats up, IBM looks to the 21st century—keeping one eye on the competition

Anatomy of A Colossus

In 1981 IBM launched the Personal Computer, joining the ranks of microcomputer manufacturers Apple, Tandy, and Commodore. The PC was and continues to be phenomenally successful. Today, IBM is sizing up the lucrative information processing market and making plans to feed the growing areas of office automation and home and small business computing. Having streamlined its internal operations, IBM is committed to developing new products and in fact will soon announce three new PCs—the Peanut, the Rover, and the Popcorn—that have excited much industry speculation. In this third and final part of "Anatomy of a Colossus," PC examines IBM's short- and long-term strategies, its competitors, and the climate it faces as the end of the century draws near.

To a stroller adept at dodging construction workers and weaving through a maze of scaffolding, IBM's new office building on Madison Avenue In New York appears near completion. The glassed-in Garden Plaza, verdant on a stark February afternoon, is a lunchtime haven for the plumbers and electricians adding the finishing touches. The Product Center on the ground floor is already alive with activity. Translucent blue panels have been set into the granite facade, to crown IBM's distinctive corporate logo. At a time of worldwide recession the building is a sparkling symbol of IBM's optimism and self-confidence. The race to corner a burgeoning information processing market has begun, and IBM hopes—and expects—to pull away from the crowd.

Today a $30 billion colossus, IBM is poised to move in many directions over the next 2 decades. Its success will depend on its mastery of distribution channels, its commitment to keeping products compatible and costs low, and its ability to produce software for a variety of machines.

But short-term strategy is equally important, and IBM is implementing a plan designed to ease its entrance into any market it finds attractive. The strategy combines tighter controls over produc-

Illustration: Robert Conrad

Part III



tion and distribution with an awareness that trends must be carefully monitored and new areas explored.

IBM has recognized that the automation of production operations is necessary today in order to keep costs down. Since 1978, it has invested over $4 billion in new plants and equipment and has added some 20 million square feet of plant production capacity throughout the world. This expansion was essential as production of its increasingly popular mini- and microcomputers was stepped-up.

In addition, there have been significant changes in IBM's traditional methods of distributing and marketing its low-priced products. Personal computers and other office products are now sold through independent distributors, mail order catalogues, and IBM-owned retail stores—moves that would have been considered sacriligeous 10 years ago.

Finally, IBM is safeguarding its future by keeping an eye out for high-growth markets. It has targeted several developing areas that it previously ignored, principally information processing, telecommunications, distributed data processing, and networking.

Over the next 10 years, IBM's strategy will touch every facet of the information processing business. Industry watchers predict that IBM's annual growth rate will jump from a traditional 13.3 percent to 18-25 percent by 1985. Given such rapid growth, its revenues could top $60 billion by then.

INDUSTRY watchers predict that IBM's annual growth rate will jump from a traditional 13.3 percent to 18-25 percent by 1985.

Today's computer industry, however, is mercurial. Vendors are charging off in many directions. Computers are invading the nontraditional areas of telecommunications and information processing. Sophisticated telephone equipment now permits teleconferencing, where callers' images are projected along with their voices. Microprocessors turn basic system units into answering machines, or automatically redial numbers that are busy. In the future, televisions will be hooked up to remote data bases, and remaining distinctions between computers and communications devices will blur and finally merge.

The PC Takes Off

The Personal Computer, stepchild of the mini- and grandchild of the mainframe, is just one weapon in IBM's arsenal but it has a momentum of its own. It is likely that IBM will expand the distribution channels for PC products sometime in 1983. It will reportedly make the PCs available to value-added re-marketers (VARs) that serve as original equipment manufacturers (OEMs) for other IBM products such as the Data Master and Series I computer. These VARs will then resell the PC, stepping up its distribution considerably.

In its short life the PC has attracted three distinct constituencies, and pundits predict that over the next 2 decades the PC we know today may evolve into three distinct products: one figuring prominently in the trend toward office automation and executive workstations, one serving as a home entertainment and education module, and one serving as a stand-alone machine for the small business user. In each of these areas, users will have different performance expectations and levels of expertise, and hardware and software needs will vary.

Office Automation

"Office automation" is the computing buzzword of the 1980s. Its proponents believe that it will effect sweeping social changes in the office, transforming everything from workers' roles to the ways in which executives communicate. Office automation refers prosaically to the linkage of computing and communications, resulting in a shared network of information. It encompasses the disparate areas of word processing, facsimile (similar to a remote Xerox machine), voice simulation, distributed data processing (which puts computing power at the local site), electronic mail, local area networks (LANs), and global area networks (GANs). It includes mainframes, peripherals, software, services, support, training, and media.

The office automation market is expected to reach $155 billion by 1988 (it is now a $65 billion market, one-third of which is mainframes). Recent acquisitions by IBM in the semiconductor and telecommunications industries signal the company's determination to focus on office automation in a big way. IBM recently signed an agreement with Canada's Mitel Corporation to jointly develop SX-2000 PBX technology, and, in January 1983, purchased 12 percent of Intel's common stock with an option to purchase an additional 30 percent over the next several years. The Intel purchase effectively shuts out any potentially hostile suitors to its advanced, state-of-the-art microprocessor chips or 4 megabyte memory devices.

IBM's present strategy in the infant office automation market is to "get the IBM logo on executive desks," says Brian Jeffries, an analyst at Strategic, Inc., a market research firm in San Jose, California. IBM has several advantages over its competitors in the office automation race, which is geared largely to serve the Fortune 1000 corporate client. In a concentrated and focused series of moves since the 1950s, IBM has substantially penetrated the corporate environment, setting *de facto* standards in mainframe markets, establishing the System/370 instruction set and SNA protocols (IBM's industry-standard data processing architecture that enables large mainframe computers to function as part of the same network), and locking in a loyal customer base firmly committed to IBM software. Over the years, IBM sales and support personnel have gained the trust of the data processing kingpin—the corporate management and information systems (MIS) director—who often resents his increasing loss of control over the information flowing through his office.

However, the micro-, mini-, and mainframe traffic jam that exists in corporate office suites today is hampering the growth of automation. No level within a company is spared from the backlash of incompatible machines that department managers have purchased, based on ephemeral individual preferences. IBM has attempted to right the problem, at least where its own products are involved.

In an effort to alleviate the friction between competing sales teams that were marketing overlapping product lines to the same customers, IBM decentralized its management structure in October 1981. Its three marketing divisions, the National Accounts Division, the National Marketing Division, and the Information Systems Division, were reorganized along product lines.

RECENT acquisitions by IBM in the semiconductor and telecommunications industries signal the company's determination to focus on office automation in a big way.

But the traffic problem has dogged IBM since the mainframe era and will not disappear overnight. "IBM's present product line-up just doesn't make sense," says Gregg Kelsey of the San Francisco-based venture capital firm Habrecht and Quist. "The PC, Displaywriter, and Data Master all compete and get in each other's way." The problem is compounded by the fact that IBM's corporate philosophy has always been rooted in protecting its product base at all costs, even down to sidestepping new technologies that would make existing products obsolete. This is based on pure pragmatism, as software conversion for a mainframe customer is prohibitively expensive.

Esther Dyson, an analyst in the New York market consulting firm Rosen Research, envisions that "a networked PC integrated into IBM's existing product line" will be the central focus of IBM's office automation strategy. Dyson thinks IBM has already begun to make inroads here by offering the UCSD p-System on the Displaywriter and for the PC. Office systems must operate in conjunction with each other, she says, and the stand-alone



paradigm of the 1980s will only be counterproductive in the networked office of the future.

A semiconductor industry spokesman predicts that the office automation market will evolve into what he calls a "seamless transparent network" where linked systems share files and where users aren't aware if information is being transferred from the next room or the next state. In this network, he says, "you won't know where your system ends and the remote system begins."

The Workstation of the Future

The workstation is a key component of an automated office. "The PC will dominate the workstation decade," says Brian Jeffries, who predicts that it will integrate voice capability, data exchange, and graphics imaging. He believes that the workstation will incorporate the superior traits of Xerox's Smalltalk and Star, and the Apple Lisa. (Smalltalk is a theoretical concept referring to a multipurpose medium that will perform a variety of functions—from programming to note-taking in a computer library.) While Jeffries admits that a "super" executive workstation will not become a reality for several years, by 1990 it might include such features as a high-speed laser printer (with screen graphics, plotting, and color capabilities), a fax machine, and a PBX, allowing its user to "talk" globally.

OF ALL PCs SOLD in retail outlets, an astounding 50 to 70 percent ended up in homes.

The Dream and the Reality

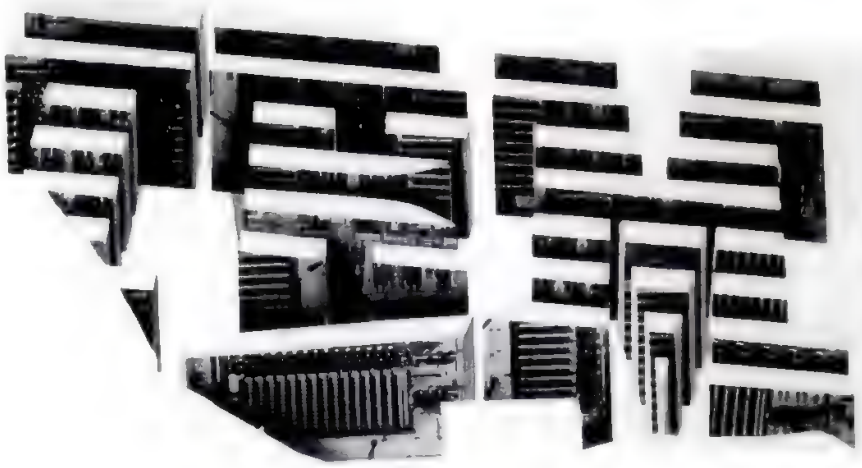
In 1983 there is a daunting gap between the dream and the reality. The office automation scenario is stalled by the chronic lack of standards. Today's office machines share no common disk or data formats, have no standard documentation, and software quality varies widely. Information is scattered and cannot be controlled by the data processing manager. There is a visible seam in the integration of the various machines.

In fact, a coherent office automation environment will emerge slowly, if it emerges at all. Local area networks, for example, are cryptic and incompatible, possessing neither adequate software nor support, and Brian Jeffries predicts that it will be at least 5 years before file transfer and electronic mail become commonplace.

But the trend toward office automation will snowball, says Robert Costain of DataQuest in Cupertino, California. He foresees no saturation point ahead as developers respond to technological advances rather than to any well-defined market need.

The Home Market

Ultimately, IBM hopes that the per-



Peanuts and Popcorn

News "leaks" are a rarity at IBM and nobody ever really knows what to expect. As IBM prepares to introduce three new products, speculation runs high . . .

By the end of 1983 IBM will launch Peanut, Rover, and Popcorn, three new microcomputers that will be targeted at segments of the home, small business, and corporate markets. The Peanut will retail for around $800 at mass-market outlets such as Sears, K-Mart, and Penney's. It will contain an Intel microprocessor, a single-unit keyboard, 64K on-board memory (expandable to 128K), and a built-in hard disk. The Yankee Group's Clive Smith speculates that before officially announcing the Peanut, IBM will upgrade its current PC to protect it from obsolescence. Enhancements, he says, will include increased graphics capability, system networks architecture (SNA) emulation, an improved color monitor, and increased storage.

The Rover reportedly will connect to a 3270 dumb terminal, allowing users to tap into mainframes. There are already 1.5 million 3270s and other compatible terminals in operation, making this market lucrative. Speculation about the Popcorn pegs it as a "super" computer with a powerful Intel microprocessor, a Zenix-based operating system, high-resolution color graphics, and interactive devices such as a mouse or light pen. It is expected to retail for $2,000. —*KB*

sonal computer will bring it into the home as the mainframe led it into the corporation in the 1940s. John Opel, chief executive officer for IBM, views the home market "as inevitable as the sunrise tomorrow." The home market is huge and growing. Analysts estimate that over two million home computers of all makes were shipped in 1982, a figure that is expected to triple in 1983. A recent IBM study concluded that of all PCs sold in retail outlets, an astounding 50 to 70 percent ended up in homes.

IBM is rapidly positioning itself to move more deeply into the home computer market and it has assessed its weaknesses with a critical eye. To gain valuable experience in a consumer-oriented high-technology field, IBM recently formed a joint venture with the Music Corporation of America (MCA), purchasing Disco Vision Associates to program and produce video disks. In addition to its potential as a data storage medium, the video disk will be important if the home computer market develops as an entertainment center as well.

The home market is booming but is still not well-defined. It touches entertainment, education, financial spreadsheets and accounting, and consumer information services such as The Source and CompuServe. Competitors for the home dollar have staked out their territories—Atari in games; Texas Instruments in education; and Commodore, Tandy, and Sinclair are targeting the entry-level consumer. Perhaps as a result of their media saturation, the products of these companies are generally viewed as mere gadgets or expensive toys by much of the industry. By lending the credibility of its business persona to the low-end consumer market IBM may correct this imbalance and promote the PC in areas of home computing that have remained virtually untouched.

"Once you've got the PC in the home," speculates Boston's Yankee Group analyst Clive Smith, "it can do anything—from telebanking and teleshopping to education." Smith thinks that IBM has a good shot at this market since "Apple is trying to be too many things to too many people" and the plethora of other competitors that have staked out a market "do not pose a serious threat."

The personal computer will become more accessible to the neophyte home user. Price reductions in the cost of integrated circuits mean that more computing power will become available at lower cost. Esmund Lyons of the Stanford Research Institute in Menlo Park, California predicts that the cost of a standard personal computer will plummet to $350 by 1990. Software is entering its second generation and is becoming cheaper and easier to buy and use. Recent breakthroughs in operating system environments incorporating "desktop" and "window" metaphors, interactive devices like the mouse, and graphics features such as on-screen icons are smoothing transition of the PC from the board room to the living room. Ida Cole, Director of Product Marketing for the Apple II, says that upcoming second generation software will make home computers as easy to use as the telephone and "you don't have to be an expert to make a phone call."

Second Generation Software

Software is becoming less expensive and more widely distributed. For example, a new word processing package called *Word Vision* retails for $50 and will be sold in bookstore chains. Cole predicts that in the not-too-distant-future, software will be sold off racks in stores like K-Mart and Penney's "stuffed by rack jobbers like L'egg boutiques." And the consumer's bastion, Computerland, recently announced that it will begin marketing software in 75 "software satellites," saturating shopping malls and other areas of high pedestrian traffic.

THE PERSONAL computer will become more accessible to the neophyte home user.

The Upscale Buyer

In the home market, Esther Dyson of Rosen Research predicts that IBM will hold onto its image as a class outfit for the upscale client, "who discusses geopolitics over dinner rather than what went on during the last 'I Love Lucy' show."

Clive Smith agrees, and expects that "IBM will claim the market that everyone knows is there but few are specifically targeting." He calls it "the elite young stockbroker constituency," those who will use their PCs for everything from plotting *VisiCalc* spreadsheets to educating their children.

Brand identification and loyalty at the consumer level are extensions of IBM's corporate philosophy. IBM postulates that today's savvy video whiz kids will take their computer know-how with them to the Harvard law library and then into the rarefied atmosphere of the corporate boardroom. Brian Jeffries likens IBM to the Jesuit religious order: "If either of them gets you before the age of 7, you're theirs for life."

Small Business Systems

IBM is moving rapidly on the small business systems front and has already garnered 35 percent of the market, according to International Data. The small business owner is not interested in networking or global communication, but will select a product based on image and brand identification, to ensure reliable follow-up support. Stores that focus on the needs of the small business user will flourish, like California's new Business-Land chain.

The needs of the small business users differ significantly from those of the corporate customer. The owners and managers of small business are often novices who require patient handholding as they learn how to operate small computer systems. Their software packages are usually similar to those of the corporate customer, but on a smaller scale. They require a software base capable of performing entire operations in-house, from general ledger to message retrieval and bill paying.

Post-Shakedown Survivors

Many industry watchers foresee that by the end of this decade the information business will be dominated by post-shakedown survivors IBM, AT&T, and the Japanese. IBM does not face substantial competition on the home front. The BUNCH, an acronym for IBM's second-tier mainframe competitors Burroughs, Univac, NCR, Control Data, and Honey-

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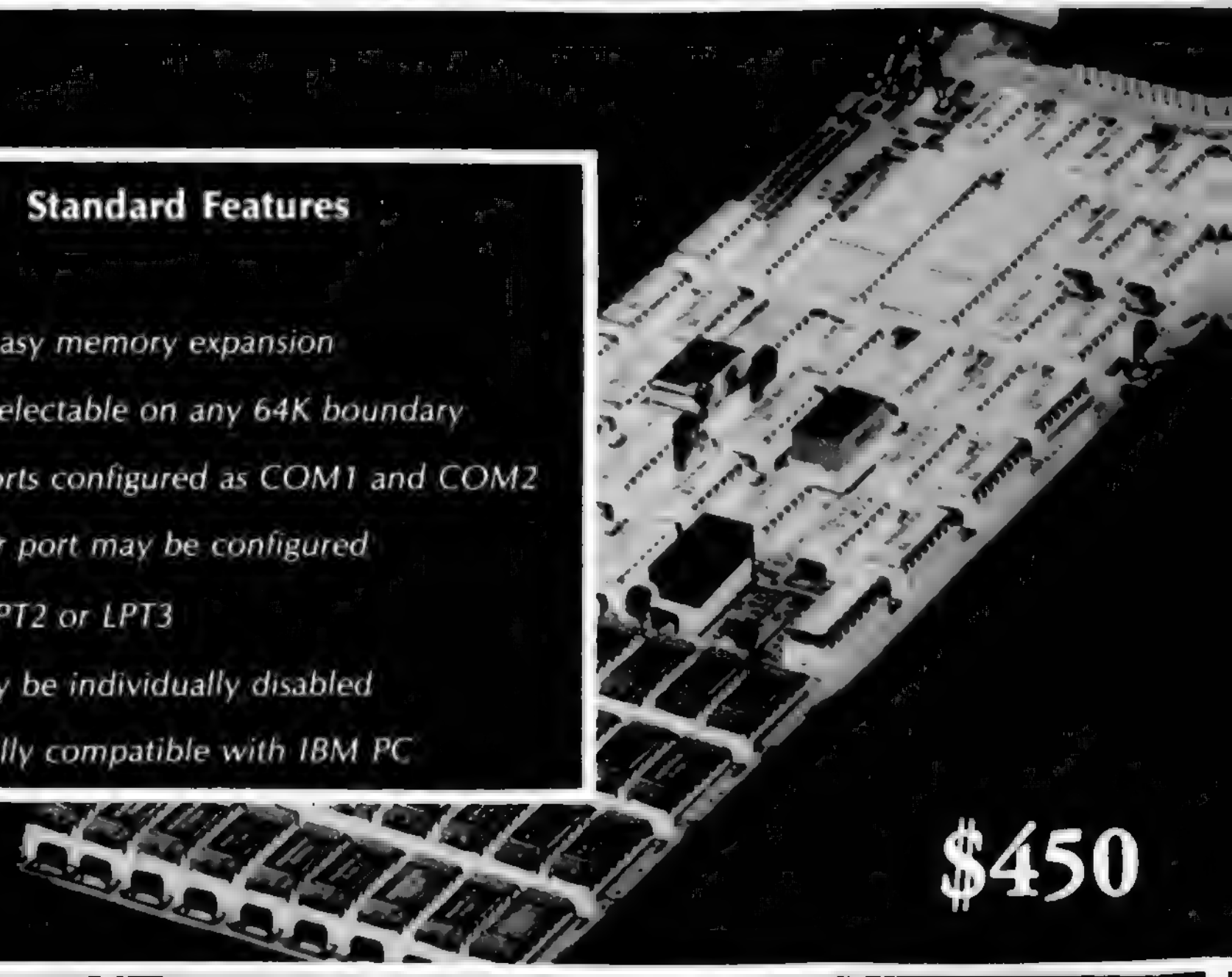
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well, do not have IBM's close rapport with MIS directors. Likewise, microguerilla competitors such as Texas Instruments, MAD Computers, and Com-Paq are only fleas on IBM's corporate back. Other domestic companies—Digital Equipment and Hewlett-Packard in the minicomputer area and Wang and Xerox in office products—have staked out specialized territories and do not pose a serious threat.

Vying with AT&T

IBM faces its major competition from a newly sleek, deregulated AT&T. Both companies will be trying to develop technologies as quickly and as cost-effectively as possible. IBM and AT&T will begin to invade each other's turf, AT&T with a line of Unix-based computers and IBM with a concentrated foray into digital PBX technology. In fact, the invasion has already begun. IBM and Mitel will jointly develop a PBX, and AT&T has released its Antelope 3B20 and Dimension systems. The Antelope 3B20 runs Unix development systems and has data processing capabilities; the Dimension product is a vast multipurpose system capable of energy management.

BRAND identification and loyalty at the consumer level are extensions of IBM's corporate philosophy.

The two companies are formidable. Recent legislation has removed the shackles from IBM, once hamstrung by a 13-year antitrust lawsuit brought by the U.S. Justice Department, while the divested AT&T is in many ways more powerful than before the deregulation ruling. Both will be competing for market share of products and services such as digital PBXs, intelligent terminals, satellite communications, teleconferencing, executive workstations, and videotext technology (which concerns consumer access to data bases). Each enters the ring armed with fat R&D budgets and wide distribution networks. Decisive factors will be the relative growth rates in crucial high-tech areas of the two companies, and the cost effectiveness of each new venture.

An AT&T strength is that most American homes and businesses already have its equipment in place. Since the costliest part of networking is the actual wiring (running a conduit or cable troughs into a building costs upward of $25 a foot for labor plus the cost of the cable itself), AT&T has a definite head start.

AT&T's on-site communications equipment will prove to be another advantage as the networking wars heat up. AT&T derives $16 billion in revenue from this equipment, and whenever IBM sells a communications-related product, AT&T receives revenue from the sale. The

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reverse, of course, does not occur.

But AT&T has several weaknesses. Inured by many years of rigorous federal regulation, it may find it difficult to plunge right into the risk-taking ventures of an exploding computer industry. In addition, AT&T is an American-based company with no overseas plants, contacts, or distribution channels in place—glaring disadvantages when competing against the multinational IBM.

Other Contenders

IBM must confront two other challengers for control of the home and consumer market: a booming cable television industry, and the Japanese. In cable, entrepreneurs have been busily wiring the entire country with coaxial cable. Equally threatening is the Japanese government-industrial combine of Sony, Mitsubishi, Hitachi, Fujitsu, and Nippon Electric, which boast distributors all over North America for such consumer-oriented products as televisions, cameras, and radios.

Both groups will be in a good position in the years ahead as a concept called videotext takes hold of the home market. Videotext will integrate data processing functions with cable television, allowing users to tap into a central data base. Once up and running, videotext will permit subscribers to shop from stores, pay bills, send messages, and communicate with their neighbors—all without leaving their homes.

THE information business will be dominated by post-shakedown survivors IBM, AT&T, and the Japanese.

The government-subsidized Japanese manufacturers excel at mass producing low-end hardware and are well-positioned for economies of scale. The Japanese government recently siphoned over half a billion dollars into developing large-system software, an area in which the Japanese have heretofore been notoriously weak. They are also on the cutting edge of R&D and are designing fifth generation mainframe architectures that will incorporate artificial intelligence. Today, the Japanese have a 10 percent share of the world's computer market, a figure that is expected to triple by decade's end. Such a surge would be a serious blow to IBM, which earns 52.6 percent of its revenues from international operations.

Despite their sophisticated distribution channels in most markets abroad, the Japanese are weak in distributing and supporting their computer products in the United States. Brian Jeffries predicts that IBM will be forced to adopt a cooperative attitude toward Japan, and that each will begin to augment the other's

WHAT IS A MOUSE?

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strengths. "There's nothing generic about their enmity," he says of the inevitable Japan-IBM shakedown.

IBM's Challenge

With its 341,279 employees, centralized management structure, 15 divisions, myriad subsidiaries, and 23 plants located in 15 countries, is IBM simply too large to cope with a changing marketplace? Will it be able to maintain the momentum of recent years?

Historically, IBM has always mustered the resources to radically change direction. In 1914 Thomas Watson Sr. saw the opportunity to enter America's offices with a new calculator, and changed the face of information flow forever. In 1946, his son, Thomas Watson Jr., sensed the potential of temperamental 3-ton vacuum tube computers and convinced IBM's board of directors to back his hunch. In the early sixties, three senior managers bet the company's financial survival on the success of a new family of integrated products—the 360 line—and won. And, in 1981, IBM introduced a personal computer and the fledgling industry held its collective breath. So far, so good.

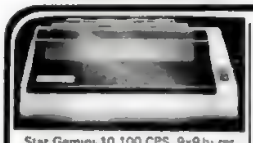
THE SMALL business owner is not interested in networking or global communication.

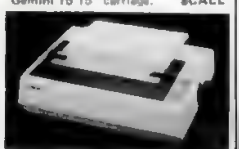
Five-Year Projection

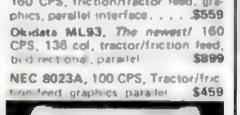
"To project 5 years hence is the stuff of dreams," says Clive Smith. "The market is moving so fast and in so many different directions that, in this business, 5 years equals 50 years." John Opel has said "you can get ahead, but you can't get 10 years ahead."

It is certain that information services will play a key role in IBM's immediate future. It recently re-entered the market after a 6-year court-imposed hiatus. (Following an antitrust settlement levied against it in a 1973 Control Data Corporation suit, IBM was forced to sell its Service Bureau Corporation and withdraw from the information services arena.) "Information services" is an umbrella term encompassing such specialty niches of computing and telecommunications as data-base processing, electronic funds transfers, networking, and electronic mail. The field offers profit margins of 30 to 40 percent. Ken Churilla, a market research consultant at Input Incorporated in San Jose, predicts that by 1986, IBM's processing services ventures will generate $200 million.

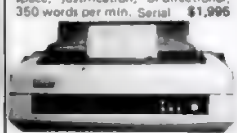
Presently AT&T's Net 1 system and IBM's Information Network Services (INS) both offer remote computing capabilities. However, INS is limited to basic services such as helping users migrate to IBM systems from Honeywell or Burroughs mainframes. The key to the new IBM services business may be its invest-


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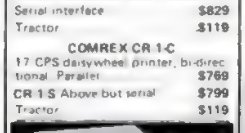

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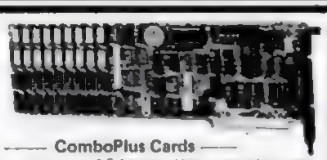

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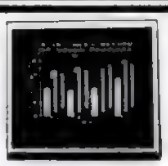
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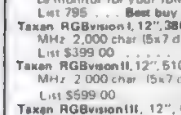
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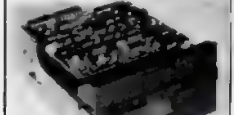
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ment in Satellite Business Systems, which designs and installs data and voice networks that transfer information via satellite between two locations. Strategic's Brian Jeffries says that with the advent of INS, IBM is "putting its toe in the waters of remote computing" in preparation for a more directed effort later.

In information services and other endeavors, the newly reorganized IBM has several advantages over its competitors. It excels at recruiting, training, and motivating personnel to market its broadening product lines domestically and abroad. It is rich enough to purchase companies that manufacture state-of-the-art technologies that are not cost effective for in-house development. And IBM, like many of its Japanese rivals, is vertically oriented, producing everything from tiny springs to the most complex software. It is also an integrated company, capable of applying any new technology (the "master slice" logic chip, for example) across different product lines already in its stable, from System 4300 mainframes and System/38 small business machines down to the Personal Computer.

TO PROJECT 5 years hence is the stuff of dreams; in this business, 5 years equal 50 years.

The Year 2000

Weighing all the strengths and weaknesses of the various corporate combatants as they mobilize for the future reveals no certain victor. Adam Osborne, designer of the Osborne portable computer, predicts that the long-term winner will be IBM. "The magic of the IBM name touches a nerve in people," he says.

The consensus among industry analysts is that by the year 2000, IBM will be the largest multinational electronics corporation in the world. To achieve this, it must dominate the paperless office automation revolution and other rapid-growth areas. It must continue to upgrade manufacturing and production facilities, reorganize when necessary, set standards, and direct mainframe architectures.

As the cost of hardware, software, telecommunications devices, earth satellites, and earth stations declines, IBM's direction must surely change, driven by what John Opel calls "the limitless demand for information" coupled with the price elasticity of the computer market.

Again, there are no sure bets. But there is no doubt that as computers merge with telecommunications and other embryonic technologies, nothing short of a revolution is at hand, and no facet of our lives—from how we learn to how we travel and do business—can remain untouched.

It recalls the ancient Chinese toast—or curse—"May you live in interesting times." International Business Machines has, does, and will. */PC*

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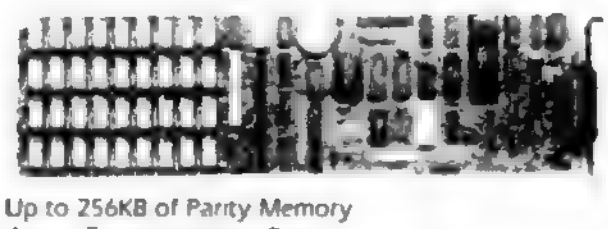
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SMITH-CORONA TP-I
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PRINCETON MONITOR
High Resolution RGB Color Monitor Designed for the IBM Personal Computer.

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Austin, Texas 78750

(512) 250-1523
Technical & Texas

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CIRCLE 170 ON READER SERVICE CARD



HOSTCOMM

by JANADON

$170.00

The Complete Host Communications System

★Features:

- The first Host communications system for the IBM Personal Computer
- Run programs from a remote site with a terminal or another computer
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- Three level password protection
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PCE-MAIL — designed to allow Hostcomm users to leave messages and correspondence for other users. Passwords permit privacy, "wildcard" addresses permit generalized mail. Help files provided. **$80.00**

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HOST UTILITIES I — a series of 4 utilities for use with HOSTCOMM. MENU-MOD simplifies menu management. Other options compute file sizes and transmit times, list menus and filespecs. **$49.95**

HOST UTILITIES II — HOSTMENU permits alteration of a Download Menu, or changes to a higher number menu. HOSTFILE uses a password scheme so that only certain callers may download files. **$49.95**

ORDER TRANS — a program used with HOSTCOMM to provide callers with information about your products. Product descriptions are contained in a separate file for easy modification. Pertinent order information may be requested and stored from callers. **$39.95**

★Minimum Systems Requirements:

- 128KB System Unit
- 320KB Diskette storage (1 or 2 drives)
- PC-DOS 1.0 or 1.1
- Printer
- Asynchronous Communications Adapter
- Hayes Stack™ Smartmodem 300 or 1200
- Video Display (40 or 80 characters)

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- Non-stop battery clock runs even when the computer is off
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- Jumper selection provides configuration of LPT 1 or LPT 2 without interfering with the operation of standard parallel printer port on the monochrome board
- Parallel interface includes cable, standard Centronics connector and protocol

---

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CIRCLE 228 ON READER SERVICE CARD

New On The Market

HARDWARE

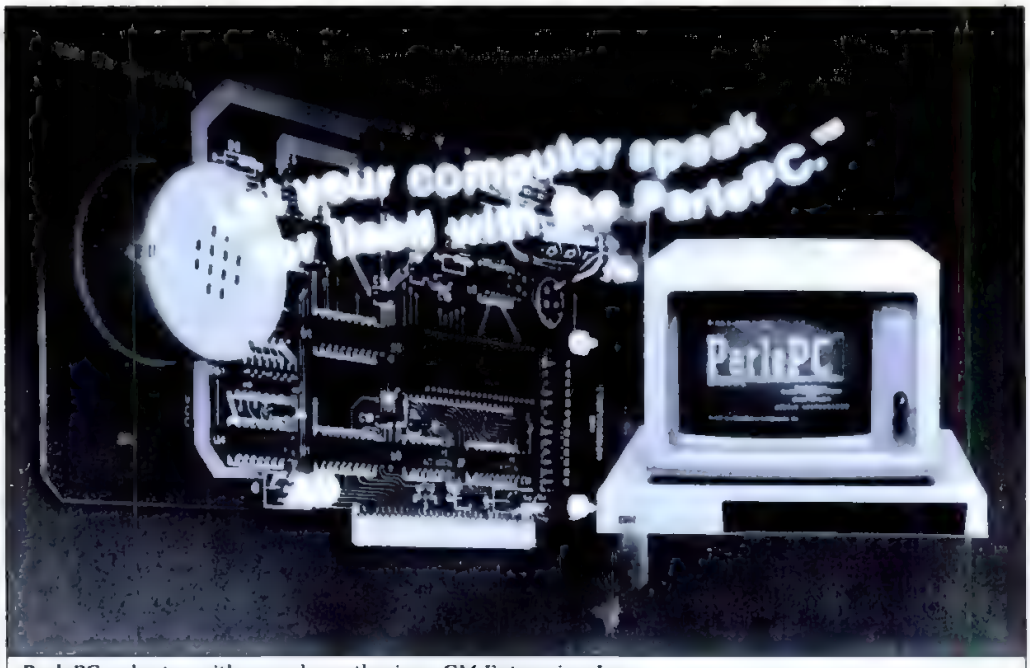
ParlePC

A programmable general purpose parallel input/output adapter with speech synthesizer that plugs directly into any available input/output slot inside the PC and operates entirely under control of user provided software.

The adapter provides unlimited vocabulary speech output for a variety of applications in office automation systems, business education, entertainment, aid to the handicapped, security control, computer aided design and manufacturing.

The ParlePC has an onboard audio amplifier, speaker and a jack for an external speaker. The ParlePC can be used with direct text-to-speech algorithms, offers external control of the speech synthesizer and can be used to synchronize external events with speech output.

The adapter has 24 general purpose TTL compatible I/O lines, programmable I/O configuration complete handshaking protocols bi-directional bus mode, signal bit set/reset capability and supports interrupt and/or software poll environments. *(List Price: $199)*
Requires: Information available from manufacturer.
GM Enterprise, Inc.
485 E. Granville Ave.
Roselle, IL 60172
(312) 893-1171
CIRCLE 600 ON READER SERVICE CARD



ParlePC, adapter with speech synthesizer, GM Enterprise, Inc.

Mountain Hard Disk

A 5- or 10-megabyte Winchester technology hard disk system, including a RAM-disk program/Stand-alone units are compatible with standard PC-DOS commands. The interface card includes a clock which automatically sets time and date at power-up. Utility software is included to back up selected volumes or the entire disk to floppy diskettes. *(List Prices: $1,995 and $2,495)*
Mountain Computer, Inc.
300 El Pueblo Rd.
Scotts Valley, CA 95066
(408) 438-6650
CIRCLE 603 ON READER SERVICE CARD

Quarter Megabyte

A fully populated 256K RAM board, with disk emulator software included. Full parity checking, *(List Price: $495)*
Microlog, Inc.
222 Route 59
Suffern, NY 10901
(914) 357-8086
CIRCLE 604 ON READER SERVICE CARD

8-inch Disk Drive Adapter

The PC-107 adapter board supports as many as four 8-inch disk drives, single or double density, single or double-sided. A format utility, driver source code and software to allow transfer or files between standard 8-inch single density CP/M diskettes and PC-DOS diskettes is included. *(List Price: $395)*
Microlog, Inc.
CIRCLE 605 ON READER SERVICE CARD

New on the Market *does not review products, but reports information provided by the manufacturer. If you have a product you would like to have included in this section, send a brief description that includes applications, price, and system requirements to* New on the Market, PC, *One Park Ave., New York, New York 10016. Photographs and illustrations are run on a space-available basis.*

New On The Market

PC Modem Plus

A communications package that was designed to communicate with independent information services such as The Source and the Dow Jones News Retrieval services.

The package which can also send electronic mail via the PC provides a microprocessor-based, auto-answer/auto-dial 300 baud modem with a buffer, extra serial port, and high speed expandibility. Menu-driven communication software is included along with a modular phone cable. The modem is expandable to 1200 baud full duplex with the addition of a piggy-back card.

The program has a 2K memory in the modem that buffers incoming data to prevent character loss. The modem operates at both full- and half-duplex and is hardware and software compatible with the PC. *(List Price: $389)*
Requires: 64K, PC-DOS Version 1.1.
Ven-Tel Inc.
2342 Walsh Ave.
Santa Clara, CA 95051
(408) 727-5721
CIRCLE 601 ON READER SERVICE CARD

PC Modem Plus, Ven-Tel Inc.



Transtar 130

A daisy wheel printer designed to provide letter quality print and full word processing functions.

The Autoload feature is designed for the most common printing applications, such as correspondence on letterheads and drafting reports. This feature allows the user to load single sheet paper to one of four selectable positions. *(List Price: $895)*
Transtar, Inc.
2110-116th N.E.
Box C-96975
Bellevue, WA
(206) 454-9250
CIRCLE 608 ON READER SERVICE CARD

Transtar 20

The Transtar 20 12-inch green monitor features a high resolution 2,000 character display for word processing, high resolution graphics, and business and scientific uses.

Transtar has reduced the angle of its nonglare green screen to help eliminate reflections from overhead office lights. *(List Price: $169.95)*
Transtar, Inc.
Box C-96975
Bellevue, WA 98009
(206) 454-9250
CIRCLE 609 ON READER SERVICE CARD

Transtar 315

The Transtar 315 uses a four-hammer head with a rotating platen to provide quality color printing. Since each of the four hammers prints only one of the four primary colors, over 30 possible shades can be printed in a single pass of the printhead. This single hammer/single color design also keeps colors true and clean by preventing bleeding or contamination of the ribbon, often caused by ink residue left on the hammer. *(List Price: $599)*
Transtar, Inc.
2110 116th NE
Box C-96975
Bellevue, WA 98009
(206) 454-9250
CIRCLE 610 ON READER SERVICE CARD

Perfect Data Series

Cleaning and maintenance products for disks or daisy wheel printers. The Perfect Data Model 400-PX for "Phoenix type"CMD disk cartridges allows users to verify critical mechanical tolerances, as well as to clean disk surfaces. Its solution and cleaning pads safely remove contamination from disks.

Also available is the Perfect Data Type Element Cleaning Kit for keeping printer characters sharp and smudge-free. It consists of cleaning unit, pad, and bottle of solution providing approximately 25 applications. *(List Price: 400-PX $3,495; Type Element Cleaning Kit $19.95)*
Innovative Computer Products
18360 Oxnard St.
Tarzana, CA 91356
(213) 996-4911
CIRCLE 606 ON READER SERVICE CARD



BUFF-ET, printer buffer, Renaissance Technology Corporation

BUFF-ET

A high speed printer buffer that can store up to 65,000 characters or about 30 average printed pages.

The copy feature allows multiple copies of a document without having to re-send it from the PC. The buffer has the ability to test itself and print out the results of the test. Power for the buffer can be taken off the printer power supply or a common AC adapter. Buffer size is available in 16K, 32K, and 64K. The 16K and 32K sizes are both expandable.

The buffer comes with all cabling needed to go between the PC and a parallel printer. The BUFF-ET allows other printers to emulate the IBM printer. *(List Price: 16K $249, 32K $279, 64K $329)*

Renaissance Technology Corporation
1070 Shary Cir.
Concord, CA 94518
(415) 676-5757
CIRCLE 602 ON READER SERVICE CARD

UltraRAM

Add-on memory boards for the PC in single-slot sizes ranging from 256K to 512K bytes on a single board. Standard features include programmable start address, switch-selectable on 64K boundaries anywhere in the 1M-byte address space; programmable block enable, switch-selectable enable/disable for each on-board 64K-byte block; parity detection circuitry with parity enable/disable (no latch) switch and parity alert LED; and fully expandable-socketed memory array so that a 256K board can be upgraded to 512K by adding 64K DRAMS.

UltraRAM was designed to industrial standards and uses multi-layer printed-circuit boards. UltraRAM boards are plug-compatible with IBM RAM expansion cards. UltraRAM runs all IBM-supported software as well as many other software packages including RAM disk evaluations. *(List Price: from $695 for 256K; to $895 for 512K)*

Requires: Information available from manufacturer.

Daystar Systems, Inc.
10511 Church Road, #A
Dallas, TX 75238-9990
(214) 341-8136
CIRCLE 607 ON READER SERVICE CARD

Ultra RAM, Daystar Systems, Inc.



RELAY

A communications package designed to meet the needs of business users. It provides simultaneous exchange of files and messages while printing and editing locally.

The package offers full screen techniques for communicating with other users. It is menu-driven with an on-screen facility available for help questions.

Other features include function keys designed for use by non-typists, and error detection/correction for data transfer in both directions. *(List Price: $89)*

Requires: 64K, Asynchronous Communications Adaptor, 160K or 320K disk drive, PC-DOS disk, IBM Monochrome Display or 80-column color/black and white monitor, and EIA RS232-C cable.

VM Personal Computing
60 E. 42 St.
New York, NY 10165
(212) 697-4747
CIRCLE 526 ON READER SERVICE CARD

New On The Market

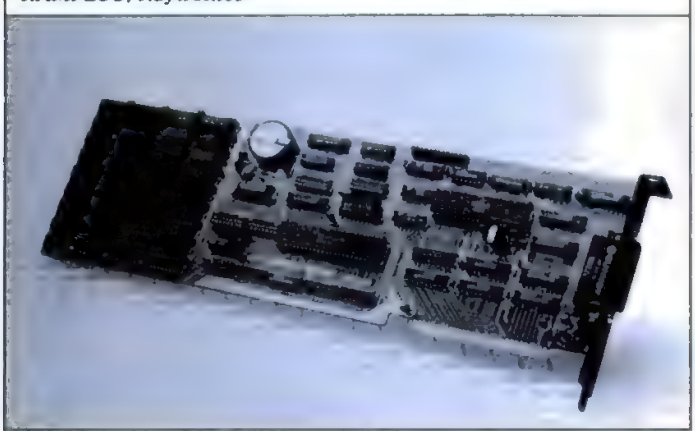
RAMPLUS

A memory expansion board that accepts up to four banks of RAM, with each bank configured as eight data bits and one parity bit. The memory banks are designed to accept either 64K or 256K RAM chips. Total memory capacity is 256K bytes using 64K RAM chips and one megabyte with 256K RAMs.

The board contains error detection logic and can be enabled or disabled with a DIP switch. Other functions include serial port, parallel port, and clock/calendar with battery backup. *(List Price: From $575, includes operating software)*

Raytronics
4901 Morena Blvd.
Building 900
San Diego, CA 92117
(800) 854-1085,
(619) 270-4000
CIRCLE 525 ON READER SERVICE CARD

RAMPLUS, Raytronics



SOFTWARE

Cosmic Crusader

A PC game from the publisher of *Snack Attack II*. Sound effects and color graphics involve the user in the "Battle to Save the Earth." Joystick or keyboard, start/stop and sound toggle keys, user-configurable controls, and multiple levels of play. *(List Price: $38.95)*

Requires: Color/graphics adapter.

Funtastic, Inc.
5-12 Wilde Ave.
Drexel Hill, PA 19026
(215) 622-5716
CIRCLE 612 ON READER SERVICE CARD

Name and Address List Management System

A user-friendly system that manages name-and-address lists. Will print listings and labels either one or two across. Listings can be selected by state, area code, exchange, zip code, or a user-defined code. *(List Price: $29.95. Documentation only, $3.95, refunded on purchase.)*

Requires: 64K, 80-character display.

M & J Automation
P.O. Box 205
Plainsboro, NJ 08536
CIRCLE 615 ON READER SERVICE CARD

VEDIT 1.37

An enhanced version of the *VEDIT* full screen text editor that features a disk directory display, ten text buffers for "cut and paste" functions, command macros which can be saved and loaded from disk.

Existing features include status line, unlimited file handling, automatic disk buffering for files larger than memory, special facilities for programming in structured languages and assembler, word wrap and paragraph formatting.

Users can recover from accidentally running out of disk space and can change disks while editing. *(List Price: $150 to $195)*

Requires: CP/M-86 or MS DOS.

CompuView Products Inc.
1955 Pauline Blvd.
Ann Arbor, MI 48103
(313) 996-1299
CIRCLE 626 ON READER SERVICE CARD

Generic CP/M Programs

Four software programs that produce a variety of multicolor graphics on any CP/M based system using a Strobe 100 graphics plotter.

The graphics programs can be used on any system supporting a CP/M 2.2 operating system and MBASIC language with 64K memory, an RS-232 port and one disk drive.

The four programs include *Business Graphics I*, for producing pie and bar charts, *Business Graphics II* for line charts and logarithmic nonlinear scales, *Stroveview*, a menu-driven package for producing flow charts and organizational charts and a program for dealers to demonstrate Strobe graphic capabilities on CP/M based computers. *(List Price: Available from manufacturer)*

Requires: 64K, one disk drive, RS-232 CP/M 2.2

Strobe, Inc.
897 Independence Ave.
Mountain View, CA 94043
(415) 969-5130
CIRCLE 625 ON READER SERVICE CARD

VED/86

VED is a screen editor developed for the 8086/8088 and other MS-DOS systems. *VED* automatically adjusts to the screen width in use (40/80 columns).

Commands are invoked by a single (mnemonic) keystroke with a status/reminder line at the top of the screen. The screen displays the current contents of the file being edited.

A "help" function displays all valid commands as well as status information, such as remaining buffer space, positions of user's markers, and current search and replace strings. The effect of most commands may be "undone" by pressing the escape key.

The VED user's guide features a tutorial section that helps familiarize the user with the most commonly-used commands. *(List Price: $79.95)*

Requires: 9K for code, MS-DOS (any version), video terminal with directly addressable cursor (for non-PC systems).

Westcoast Software
P.O. Box 65869 Station F
Vancouver, B.C.
Canada V5N 5L3

CIRCLE 634 ON READER SERVICE CARD

MultiLink

Interfaces with PC-DOS, turning it into a sophisticated multi-user multi-taking operating system. Additional users can be at as many as eight CRT terminals attached to serial parts on the PC, or through TTY terminals or other computers. The terminal users have the same general capabilities as the operator of the main console. *(List Price: $275)*

Requires: 64K, one disk drive.

The Software Link, Inc.
6700 23-B Roswell Rd.
Atlanta, GA 30328
(404) 255-1254

CIRCLE 631 ON READER SERVICE CARD

IOAS

An integrated office automation program consisting of a data base manager, an application system, a word processor, graphics, and spread sheet interface for the PC.

The program is sold in separate modules. Users can select modules, such as the word processor, report writer, or screen writer, as needed.

The *IOAS* program modules include: EXEC-I, an executive information system consisting of 7 applications: appointment, stock security, mailing list, check, personal finance, personal inventory and memo.

IDM-X, an interactive data base manager. The Screen Writer, the WORD-X word processor with full screen editor.

A 25 percent discount is available after purchase of the first module. *(List Price: $198 EXEC-I, $398 IDM-X, $198 Screen Writer, $98 WORD-X)*

Requires: 64K, two disk drives, DOS, 132-column printer; 96K required for word processor module.

Micro Architect Inc.
96 Dothan St.
Arlington, MA 02174
(617) 643-4713

CIRCLE 616 ON READER SERVICE CARD

IOAS, Micro Architect Inc.



New On The Market

AP

A menu-driven accounts payable system that keeps track of current and aged accounts payable. The system incorporates programs to maintain a complete record for each vendor, helps determine which vouchers to pay by due date or discount date, or within certain cash requirements, and prints checks automatically.

The program also forecasts cash requirements based on discount dates or due dates and ages past-due payable. *(List Price: $248, manual only, $22)*

Requires: 64K, two disk drives, monochrome display, 132-column printer, PC-DOS.

Micro Architect Inc.
96 Dothan St.
Arlington, MA 02174
(617) 643-4713
CIRCLE 617 ON READER SERVICE CARD



AP, Micro Architect Inc.

Lazer Maze

You are transported to the 24th century, a time when traditional warfare has become obsolete. Instead, disputes are settled in a form of one-to-one combat in the Arena of Final Reconciliation, a rectangular area with 40 two-digit numbers around the perimeter. The object of the conflict is to fire your laser gun and predict where the beam will exit after reflecting off one or more angled mirrors in the arena. *(List Price: $29.95)*

Requires: 48K, Color/graphics adapter.

Avant-Garde Creations
P.O. Box 30160
Eugene, OR 97403
(503) 345-3043
CIRCLE 618 ON READER SERVICE CARD

AR-I

AR is a menu-driven invoicing and monthly statement generating system that keeps track of current and aged accounts receivable. AR supports three types of accounts: open balance, balance forward, and auto billing. *(List Price: $248)*

Requires: Monochrome display, two disk drives, 64K, 132-column printer.

Micro Architect Inc.
96 Dothan St.
Arlington, MA 02174
(617) 643-4713
CIRCLE 633 ON READER SERVICE CARD

Participative Management Skills

A series of interactive tutorial programs that were designed to increase employee-management communications and business productivity.

The course can be used by either non-profit or productivity-oriented businesses. Supervisors can learn ways to improve communication, increase productivity and job satisfaction. *(List Price: $249.50)*

Requires: 64K, one disk drive, monochrome monitor, PC DOS.

Duosoft Corporation
1803 Woodfield Dr.
Savoy, IL 61874
(217) 356-3111
CIRCLE 619 ON READER SERVICE CARD

HVAC Software

Programs for duct and pipe sizing, solar heating design, and calculation of residential and commercial cooling and heating loads. *(List Price: $350)*

Requires: 128K, two disk drives, 132 column printer, and *VisiCalc*.

E. Jessup, Mechanical Engineers
4977 Canoga Ave.
Woodland Hills, CA 91364
(213) 883-9021
CIRCLE 635 ON READER SERVICE CARD

BRUISER and BLISTER

BRUISER (BASIC Program Remarks Removal Utility) and *BLISTER* (BASIC Program Listing Utility) are designed to facilitate program documentation procedures.

The *BRUISER* Utility scans a user-specified program, copies it to another user-specified file, and removes all comments and REM statements, producing a copy of the program that contains only the executable BASIC code.

The *BLISTER* Utility provides the user with a readable program listing without searching the text. *BLISTER* parses out the defining statement numbers from the statements that overflow a single line and the program comments. It also provides the program name, date, and time, along with the listing itself.

The *BLISTER* Utility allows the user to perform pagination. In addition, the page number, program version number, title, and multiple subtitles can be printed at the top of the page. By starting a new page each time a new subtitle is encountered, the user can segment the program into various functional pieces. *(List Price: $15 each; $25 for both)*

Requires: 64K, one disk drive (BLISTER only), 80 column printer.

Diversified Data System, Inc.
5227 Buchanan Rd.
Delray Beach, FL 33445
(305) 498-2772

CIRCLE 632 ON READER SERVICE CARD

Moneytrack

A money management program that can maintain complete transaction records for small businesses, investments or the users' personal accounts. The program prepares a variety of reports to help meet the requirements of financial institutions and the Internal Revenue Service and can print checks on different check forms.

Moneytrack comes with its own operating system and can be implemented by novice users as no knowledge of programming or computers is needed.

The program can be used by small business owners, farmers, investors, accounting firms, financial advisers, business managers, and professionals such as doctors and lawyers. *(List Price: $450)*

Requires: 64K, two disk drives. A printer is recommended.

Pacific Data Systems Inc.
6090 Sepulveda Blvd.
Culver City, CA 90230
(213) 559-8713

CIRCLE 633 ON READER SERVICE CARD

Business Analysts Series

A series of personal business computer software programs that can be integrated as the user needs. Each program module provides business managers with specific task management facilities and the ability to relate on application to another in the series. The series runs under the Executec Software Bus which acts as an interface between the non-technical user and the software to provide common commands, procedures, signons, and security.

Included in the series are an Integrated Spreadsheet, Integrated Text Processing, Personal Records Management and Communications.

The bus allows these applications to be transportable between computers. They can also be expanded. The bus comes with the Personal Records and Integrated Text Processing modules installed. *(List Price: Bus $450, modules $450 to $1,300)*

Requires: 64K, two disk drives. A printer is recommended.

Executec Corporation
12200 Park Central Dr.
Dallas, TX 75251
(214) 239-8080

CIRCLE 622 ON READER SERVICE CARD

FLIP-ELLO

A game similar to the Othello board game that can be played on either a cassette-based PC or on a PC equipped with a floppy disk. Players can match skills against the PC or use the computer as the playing board for two players.

The program will automatically flip all the correct pieces and keep score. At any point during the game players can switch sides with the PC, ask for a suggested move or quit the game. The board is displayed along with remaining pieces and the current score. The program will also comment on particularly good or bad moves. *(List Price: $12.50, plus $2.50 shipping and handling)*

Requires: 16K, one floppy disk, for cassette-based system. 8K for other systems.

RESUBA DIGITAL SYSTEMS
P.O. Box 440, Dept. 8
Blackwood, NJ 08012
(609) 228-5666

CIRCLE 620 ON READER SERVICE CARD

Graphics Utility

Can be used as a standalone graphics generator or to display various character sets from a BASIC program. Shapes are created and edited on an enlarged grid with the actual size shape displayed to the side. Shape size is variable up to 39 by 39 pixels. *(List Price: $55.00)*

Requires: 64K, PC-DOS, color/graphics card

Savant Software
P.O. Box 42888
Houston, TX 77042
(800) 231-9900
(713) 556-8363

CIRCLE 651 ON READER SERVICE CARD

New On The Market

Copy] [PC

A disk backup system that copies both protected and unprotected software. The program verifies the disks it creates and does not modify data. Available memory is utilized to lessen copying time. A drive speed utility is also included to aid users in spotting drive problems. *(List Price: $39.95)*

Requires: 48K, one disk drive.

Central Point Software
P.O. Box 19730, #203
Portland, OR 97219
(503) 244-5782

CIRCLE 643 ON READER SERVICE CARD

Emulation Program

A program that enables the PC to communicate with Data General computers. The assembly language program emulates the special screen and keyboard of a Data General D200 CRT terminal. The PC can access the full range of application programs for Data General computers as a terminal when connected over an asynchronous link. *(List Price: $150, includes program license, documentation, and update service)*

Requires: 64K, one disk drive.

Space-Time Labs
SR 20850
Fairbanks, AK 99801
(907) 479-4540

CIRCLE 644 ON READER SERVICE CARD

PFS:FILE and PFS:REPORT

PFS:FILE and *PFS:REPORT* are two information management programs. Like a paper filing system, *PFS:FILE* records, files, retrieves, and summarizes information. It allows the user to organize information on forms created on the computer screen. Once the basic form has been created, PFS:FILE can sort by any item on the form and search for a numeric range, wild card, or opposite match. Files can be sorted or merged, even if their form designs differ, and form designs can be changed without re-entering the data.

PFS:REPORT sorts, calculates, formats, and prints reports using the information contained in *PFS:FILE*. *PFS: REPORTS* prints up to 16 columns per report, including three calculated columns. Totals, subtotals, averages, subaverages, counts, and subcounts can be printed on every column. *PFS:REPORT* has comprehensive sorting capabilities plus automatic page numbering, title printing, and centering. Eight pre-defined report formats can be saved for repeated usage, and column headings can also be changed and saved. *(List Price: PFS:FILE—$140; PFS:REPORT—$125)*

Requires: Information available from the manufacturer.

Software Publishing Company
1901 Landings Dr.
Mountain View, CA 94043
(415) 962-8910

CIRCLE 679 ON READER SERVICE CARD

Optioncalc

Investment planner calculates the theoretical values for put-and-call options according to the Black and Scholes model. Program will calculate the value for the put-and-call option selected, the exact expiration date, the number of days to expiration, the hedge ratio, and the put-and-call symbols. Additional "what if" calculations can be performed by changing entries. *(List Price: $65.00)*

Requires: 64K, PC-DOS, color/graphics card.

Savant Software
P.O. Box 42888
Houston, TX 77042
(800) 231-9900
(713) 556-8363

CIRCLE 650 ON READER SERVICE CARD

UltraFAST

A disk RAM emulator that can overlay disk drives. Sizes from 8K to 320K per drive are configurable, depending upon RAM available. Also included is a parity handler which processes parity errors and clears all but hard errors. *(List Price: $39.95)*

Daystar Systems, Inc.
10511 Church Rd., #L
Dallas, TX 75238
(214) 341-8136

CIRCLE 653 ON READER SERVICE CARD

Tax Planner

A software program to help reduce personal tax liability through annual planning. Based on user-definable tax tables beginning with 1982, it computes tax schedules plus Schedules G, 4972, 4625, 6251 and sales tax tables. As many as four client data files can be handled at once—the first to hold current data, m additional files to contain assumed data changes. In addition, as many as four different assumption data files for a given year and tax calculations for four different years can be programmed. *(List Price: $300)*

Requires: 64K, printer

CPAids
1061 Fraternity Circle Dr.
Kent, Ohio 44240
(216) 678-9015

CIRCLE 652 ON READER SERVICE CARD

Bibliography

A program that compares citations in a manuscript with entries in a card catalog to construct a bibliography of all cited entries.

The program was designed for use by professional writers. Entries are added to the catalog using a text-editor. The program can copy entries from the catalog to footnotes in a manuscript, or replace citations in the manuscript with numbers corresponding to the order in which the works appear in the bibliography. *(List Price: $125)*

Requires: CP/M-86 or PC-DOS

Digital Marketing
2670 Cherry Ln.
Walnut Creek, CA 94596
(415) 938-2880
TELEX 17-1852 (DIGMKTG WNCK)

CIRCLE 645 ON READER SERVICE CARD

PC/HELP

A help program that displays information about PC-DOS commands on-screen.

The purpose of each command is explained, correct syntax is shown and examples of command usage are provided. For most commands hints are also displayed.

Novice users can see the command syntax and examples on the display without having to refer to a manual. Experienced users can use the program as a quick reference for infrequently-used commands or where special syntax is required.

The program can be used on any PC that uses PC-DOS.

(List Price: $29.95)
Relational Solutions, Inc.
5857 S. Gessner, #103
Houston, TX 77036
(713) 972-1800
CIRCLE 647 ON READER SERVICE CARD

VersaForm Application System

Versaform is an office environment data base capable of processing common paper business forms and producing reports from any set of data contained within a file of forms. The first two application systems templates are the Purchase Order and the Legal Office Manager templates.

(List Price: $389)
Requires: 128K.
Applied Software Technology
14125 Capri Dr.
Los Gatos, CA 95030
(408) 370-2662
CIRCLE 654 ON READER SERVICE CARD



Bizi-Calc, El Dorado Software

Bizi-Calc

A general business and accounting program that runs in conjunction with electronic spreadsheet programs. Novice users can quickly access, learn about, and use their PCs.

The program allows users to create forms for use in bookkeeping, forecasting, personal expenses, and bank reports.

The program is part of a series of business and tax programs from the manufacturer.

(List Price: $50)
Requires: *SuperCalc, VisiCalc, Multiplan, UltraCalc.*
El Dorado Software
P.O. Box 1235
Shingle Springs, CA 95862
(916) 626-8562
CIRCLE 630 ON READER SERVICE CARD

Crush, Crumble and Chomp!

A movie-monster game which lets the player assume the role of any of six hungry man-eating beasts in one of more that 100 scenarios. The player can choose to wreak havoc on New York, San Francisco, Tokyo or Washington, D.C.

(List Price: $29.95)
Requires: 64K, BASICA, color/graphics board.
Automated Simulations/EPYX
1043 Kiel Ct.
Sunnyvale, CA 94086
(408) 745-0700
CIRCLE 656 ON READER SERVICE CARD

Micro LawPack

A financial-management system for firms using a spreadsheet model to compare a budget with actual financial data. The system allows a firm to do partnership profitability reporting without using the firm's primary computer. The program is totally integrated with the *LawPack* system for large law firms.

Use of the *VisiCalc* spreadsheet allows users to change the model or any variable in order to analyze the effect of a proposed financial decision. Extensive documentation is included. An on-line "HELP" feature allows the user to receive any necessary assistance without a delay in processing.

(List Price: $1,000)
Requires: 256K, two floppy disk drives.
Computer Information Consultants
1860 Broadway
New York, NY 10023
(212) 246-7340
CIRCLE 673 ON READER SERVICE CARD

New On The Market

Air Traffic Controller

A simulation program that puts the user in charge of all the incoming traffic at a major metropolitan airport. Users must direct the runway approaches and landings, monitor planes on the radar screen, radio commands to all pilots to increase or decrease altitude or change direction. Users may even have to handle an occasional hijacking or UFO. *(List price: $29.95)*

Requires: 48K, monochrome or color/graphics adapter.

Avant-Garde Creations
P.O. Box 30160
Eugene, OR 97403
(503) 345-3043

CIRCLE 648 ON READER SERVICE CARD

Pro Football Game

A simulation of a professional football contest, including ten offensive plays, five defenses, interceptions, fumbles, penalties, punts, safeties, field goals, touchdowns, extra points, and time outs. The screen displays the playing field and scoreboard. Users can go against the computer or another player. *(List Price: $23.75)*

Requires: 64K, 80-column display, BASICA, PC-DOS, Color/graphics adapter and monitor optional.

Strategic Alternatives
459 Homer, #2
Palo Alto, CA 94301

CIRCLE 649 ON READER SERVICE CARD

Jabbertalky

A programmable word game for one or more players, including Alphagrammer, an anagram game and Cryptogrammar, a code-breaking game. A special utility program, Jabbergrammar, stores lists of words for each part of speech, and players can also create lists of their own. The program can also create free verse, randomly constructing grammatically correct sentences that give hints about the kinds of sentences generated for each skill level. *(List Price: $29.95)*

Requires: 64K, BASIC.

Automated Simulations/EPYX
1043 Kiel Ct.
Sunnyvale, CA 94086
(408) 745-0700

CIRCLE 657 ON READER SERVICE CARD

Star Warrior

The second game of the Starquest series, this science fiction/fantasy game sets up the player as an interplanetary avenger taking on an entire planetary occupation force of troopers and vehicles. The player is armed with electronic direction-finding equipment, decoys, missiles, and guns, and can walk, jump, or even fly over swamps, forests and mountains. *(List Price: $39.95)*

Requires: 64K, Color/graphics board, BASICA, PC-DOS.

Automated Simulations/EPYX
1043 Kiel Ct.
Sunnyvale, CA 94086
(408) 745-0700

CIRCLE 658 ON READER SERVICE CARD

Fas-File

Written in UCSD Pascal, Fas-File combines user-definable record formats, easy-to-use fill-in-the-form input, a select option and user-definable reports. A record may contain as many as 36 fields totalling more than 500 bytes of data. In addition, more than 100 keywords may be used to cross-reference each record. *(List Price: $145)*

Gryphon Systems
922 Grange Hall Rd.
P.O. Box 755
Cardiff-by-the-Sea, CA 92007
(619) 436-1455

CIRCLE 655 ON READER SERVICE CARD

AutoCAD

A two-dimensional computer-aided drafting and design software package, suitable for architectural and landscape drawings, mechanical, electrical, chemical, structural, and civil engineering uses, and printed-circuit design. System supports Summagraphics and Houston Instruments digitizers as well as Hewlett-Packard and Houston Instruments plotters. *(List Price: $1,000)*

Requires: 128K, monochrome and color/graphics card.

Autodesk, Inc.
16 St. Jude Rd.
Mill Valley, CA 94941
(415) 381-1819

CIRCLE 659 ON READER SERVICE CARD

TAXMODE

A menu-driven tax-planning system for individual income taxes. The system computes federal taxes for 1982 and later years, including the TEFRA provisions of 1982 and inflation-indexing beginning in 1985. Results are continuously displayed on the input screen and updated after each new entry. Several alternative computations can be displayed at the same time. Multiple report formats allow printing of reports to fit individual user requirements, including all the major IRS forms. Multiple options to compute state income tax are available. *(List Price: $299.95)*

Requires: 96K, monochrome display, printer.

Sawhney Software
888 Seventh Ave.
New York, NY 10106
(212) 541-8020

CIRCLE 645 ON READER SERVICE CARD

DDQUERY

A database management system with query, report writer, and transaction processor, the program automatically links related data items for access. A Schema subsystem is used to define the data base and establish item and set relationships. The report writer is capable of reporting data from as many as five data sets and a transaction processor allowing the user to design CRT screen forms for data input, modification, display, processing and data set updating. *(List Price: $7,500)*

Gemini Information Systems
5500 South Syracuse Circle
Englewood, CO 80111
(303) 773-1805

CIRCLE 660 ON READER SERVICE CARD

Federation

The player is commander of a Federation Starship in this arcade game. The assignment is to wipe out the invading Drorn Drones who have taken over a mining colony and are defending it with various cannons and bombs. Using keyboard commands, the player must move his ship up, down, left or right to avoid enemy fire as well as to dispatch his own weapons. *(List Price: $29.95)*

Requires: 48K, Color/graphics adapter.

Avant-Garde Creations
P.O. Box 30160
Eugene, OR 97403
(503) 345-3043

CIRCLE 661 ON READER SERVICE CARD

PC Create

A program generator which writes BASIC programs to maintain a random access file built to the user's specifications. Owners can add their own application modules. *(List Price: $50)*

Requires: 64K, one disk drive

Data Transport Systems, Inc.
347 East 62nd St.
New York, NY 10021
(212) 888-6931

CIRCLE 662 ON READER SERVICE CARD

RAMPRINT

A printer-buffer program. *RAMPRINT* captures all data being sent to the parallel printer port and stores it in a memory buffer, from which it is automatically sent to the printer while the CPU program continues running. No alterations to DOS or additional hardware are needed. A single command, which can be automatically executed, activates *RAMPRINT* and sets the size of the print buffer (from 1 to 64K), which is dynamically allocated in user memory.

The program is designed to operate invisibly to the application program. It has been used successfully with DOS, BASIC, BASIC Compiler, *Easy Writer*, *WordStar*, CP/M, *VisiCalc*, Macro Assembler, COBOL Compiler, and more. *RAMPRINT* has a quick start-up and the following keyboard command features: PrinterPause (temporarily suspends printing), Clear Buffer (clears buffer of all data), Video Display Disable (blanks the display while the system is unattended), and Stop List Enhancement (a single key can slow/pause/resume video output. *(List Price: $49.95)*

Requires: Information available from manufacturer.

STB Systems, Inc.
1701 N. Greenville, #703
Richardson, TX 75081
(214) 234-8750

CIRCLE 669 ON READER SERVICE CARD

RM/COBOL

An ANSI 74 standard COBOL compiler available under the CP/M-86 and PC-DOS. All existing commercial software using RM/COBOL will run on the PC. *(List Price: $950)*

Requires: 64K, two disk drives.

Ryan-McFarland Corporation
609 Deep Valley Dr.
Rolling Hills Estates, CA 90274
(213) 541-4828

CIRCLE 666 ON READER SERVICE CARD

Ultimenu-II

A system that provides single-keystroke control for one primary menu and an unlimited number of secondary menus. Each static menu can contain up to 36 programs, batch files, or dynamic-menu entries. A 30-character description of each entry and the current time and date are continuously displayed on each static menu. Dynamic menus list all or a subset of the files on any currently mounted diskettes. System allows automatic execution of any program on the currently defined static menu at a specific time, date, day of the week, or time interval. Logon/logoff, master and user profiles, and security by disk and file are provided. *(List Price: $89.95 plus $2 shipping and handling)*

Requires: Information available from manufacturer.

DB/DC Software Associates
P.O. Box 4695
Manchester, NH 03108
(617) 682-6629

CIRCLE 667 ON READER SERVICE CARD

Word Wire

A word processor that includes all common text-editing features such as on-screen formatting, four direction cursor control, insertion and deletion of characters, words, and blocks of text, vertical scrolling with variable scroll speed, paragraph align and justify, and text search and replace. The *Word Wire* also features print spooling which allows the user to edit one document and print another at the same time. Other features include file concatenation to build text from other sources, and the capability to underline or emphasize print where necessary. *(List Price: $89.95)*

Requires: 64K, one disk drive, a monochrome or color/graphics adapter, 80-column display, and printer.

Soft Spot Micro Systems
P.O. Box 415
North Canton, CT 06059
(203) 379-7047

CIRCLE 681 ON READER SERVICE CARD

New On The Market

General Accounting System

A modular general accounting system with modules including general ledger, accounts payable, accounts receivable, payroll, invoicing and inventory. The modules can be implemented independently or combined in a coordinated system. The invoice-driven program includes menu selection, on-screen prompting, cursor control and error correcting. A configuration program supports any combination of single or double density disk, including hard disks. *(List Price: $450 per module)*

Requires: 128K, two disk drives or hard disk, MS-DOS.

Small Business Systems Group
6 Carlisle Rd.
Westford, MA 01886-5762
(617) 692-3800

CIRCLE 664 ON READER SERVICE CARD

MicroPERT O

A high-speed, interactive, menu-driven, graphics-oriented project scheduling package. Using *MicroPert O*, projects containing 220 events and 220 activities can be scheduled in 20 seconds or less. This package also features time-scaled graphics outputs, including Network diagrams and Gantt charts. Sorting by date or department for the Schedule Report and the Gantt Chart are among the other available options. *(List Price: $500)*

Requires: 128K, two disk drives, standard printer.

Sheppard Software Company
4750 Clough Creek Rd.
Redding, CA 96002
(916) 222-1553

CIRCLE 680 ON READER SERVICE CARD

AMSCHED

A comprehensive mortgage amortization program that prepares amortization tables from input. It provides monthly and yearly breakdowns of principal and interest as well as paid-to-date figures for P&I. Running totals are provided for each year as well. Output is printed on standard 8.5 by 11 inch continuous blank paper, and documentation is included. *(List Price: $30)*

Requires: 64K, one disk drive.

D^2 Enterprises
P.O. Box 871
Shalimar, FL 32579
(904) 651-3108

CIRCLE 676 ON READER SERVICE CARD

Sapana-Soft-Index-I

A menu-driven program designed to keep track of any type of published information, such as articles, books, magazines, journals, or newspapers. This program allows the user to display or print indexes for any given combination of publication, author, topic, subtopic, year, month, and day. Entries can be viewed, changed, and deleted, and if the list contains several deleted entries, it can be compacted. *(List Price: $49.95 with manual)*

Requires: 64K, one disk drive, 80-column display, printer.

Sapana Micro Software
1305 South Rouse
Pittsburg, KS 66762
(316) 231-5023

CIRCLE 671 ON READER SERVICE CARD

Sapana-Household-Track-I

A menu-driven program designed for homeowners as a means of keeping track of household items. Small businesses can also use this program to maintain inventory. *Household-Track-I* will display or print items for any given combination of date of purchase, category, subcategory, and room. At any time, the items can be printed or viewed in groups by selecting the grouping field which may include category, subcategory, or room. For example, if the term room is selected, all the items in one room will be listed, followed by all the items in the next room, and so on. *(List Price: $49.95 with manual)*

Requires: 64K, one disk drive, 80-column display, printer.

Sapana Micro Software
1305 South Rouse
Pittsburg, KS 66762
(316) 231-5023

CIRCLE 672 ON READER SERVICE CARD

Total Recall

An information storage and retrieval program designed for list handling applications.

The program provides file capacity limited only by the amount of disk storage, the ability to create and order sublists on fifteen parameters, and fast sorting up to three levels.

Users can generate form letters and configure mailing labels including an informational line and record number on each label. One to four labels can be printed using either the entire list or a sublist. The program is compatible with both *WordStar* and *Mailmerge*. A thirty page tutorial is provided for novice users. *(List Price: $129.95)*

Requires: 64K, two disk drives, DOS 1.1, a printer.

Edward S. Sucherman Promotions Ltd.
1780 Maple St., #20
Northfield, IL 60093
(312) 446-3344

CIRCLE 646 ON READER SERVICE CARD



Total Recall, Edward S. Sucherman Promotions Ltd.

PC-108 Z-80 Co-Processor

A co-processor designed to provide quick and reliable execution of Z-80 programs designed to run in a CP/M environment on the PC. CP/M function calls are translated to the equivalent PC-DOS function calls making fully transparent operation possible. A programmer's guide is included in the documentation to allow users with special applications to develop programs with true dual-simultaneous processing capabilities. *(List Price: $495)*
Requires: Information available from manufacturer.
Microlog, Inc.
222 Rt. 59
Suffern, NY 10901
(914) 357-8086
CIRCLE 670 ON READER SERVICE CARD

D2FORM

A screen forms generator that allows the user to create his own forms on the CRT screen. Each field, along with its length and its mapped location on the screen, is stored automatically in a file. This information can be recalled by the program without the use of data statements. Printed copy contains the coordinates and size of each field. *(List Price: $45)*
Requires: 64K, one disk drive.
D² Enterprises
P.O. Box 871
Shalimar, FL 32579
(904) 651-3108
CIRCLE 677 ON READER SERVICE CARD

D2BACK and D2REST

A pair of programs that provide hard disk file backup and restoration, eliminating the need for tape drives. Built-in help screens and documentation/instructions are included. *(List Price: $35)*
Requires: 64K, one hard, and one floppy disk drive.
D² Enterprises
P.O. Box 871
Shalimar, FL 32579
(904) 651-3108
CIRCLE 678 ON READER SERVICE CARD

TEXTPLUS

The *TEXTPLUS* file management program, available in two formats, is especially designed for businesses using the PC. *TEXTPLUS* can be used for text processing and multiple format label generation, and can also be used to produce expense reports, data book entries, card files, and mailing lists. Its text processor can merge text with the user's mailing list or data base files. *(List Price: $200; compiled version lists for $240)*
Requires: BASIC version—64K; compiled version—128K. Both versions require one disk drive.
Owl Software
6927 Atoll Ave.
North Hollywood, CA 91605
(213) 982-6243
CIRCLE 674 ON READER SERVICE CARD

Reveal

A menu-driven program designed primarily for stockbrokers that provides total client and portfolio management. *Reveal* can be used to communicate with clients on their micro and transmit portfolio reports, letters, and memos. It can also be used during phone conversations.

One of the system's features is the automatic pricing capability available through various pricing services. Users have the option of receiving daily price information for all commodities, securities, options, and bonds from major exchanges.
(List Price: $1,550)
Requires: 128K, two disk drives.
Reveal Software, Inc.
6 Chelmsford Dr.
Muttontown, NY 11545
(516) 626-1166
CIRCLE 675 ON READER SERVICE CARD

Integrated General Accounting System

An integrated group of independent menu-driven programs for accounting tasks including General Ledger, Accounts Receivable, Accounts Payable, and Order Entry with billing, inventory control, and sales analysis. Programs were developed using Pascal MT+, and an integral B+ Tree file manager has been used to take advantage of high-capacity storage devices for users requiring large data bases. The programs are compatible with any system running CP/M-80 or CP/M-86. *(List Price: $3,000 for the total system, $950 for each independent program)*
Requires: Information available from manufacturer.
Small Business Systems, Inc.
1016 E. 31st St.
La Grange Park, IL 60525
(312) 579-3311
CIRCLE 668 ON READER SERVICE CARD

Data Reporter

A new data base management software package featuring search and sort functions, file merge, a reformatter, global editing, menu-driven commands, and a label-making utility. The *Data Reporter* also provides optional password protection, batch file processing of recurring tasks, a fully copyable disk, and seven different types of search routines. One search routine, called Soundex, gives the user access to data when its exact spelling is unknown. When the approximate spelling of the data is typed in, the *Data Reporter* will search and display anything with a similar spelling. *(List Price: $250)*
Requires: 64K, MS-DOS.
Synergistic Software
830 N. Riverside Dr., #201
Renton, WA 98055
(206) 226-3216
CIRCLE 682 ON READER SERVICE CARD

New On The Market

The C.B.S. System

A new financial and records management system for health care facilities designed to improve financial control and in-patient cost accuracy. The system prepares detailed reports such as bills, patient billing history, accounts receivable, payroll, patient census and summary, and general ledger with budgets. *(List Price: $18,965)*

Requires: 192K, one hard disk drive, MS-DOS, 132-column dot-matrix printer.

Convalescent Business Systems
2609 Honolulu Ave., #B
Montrose, CA 91020
(213) 957-8387
CIRCLE 529 ON READER SERVICE CARD

Edit

A full-function screen editor designed for generating programs and other text files. Edit uses all the specially defined editing keys of the PC and features paging, scrolling, search, and cut-and-paste (utilizing reverse video). All of these features are supported by single strokes of the function keys. Other features include programmable tabs and a help screen. Edit works with files of any size and creates files that are fully compatible with all of IBM's compilers and the IBM assembler. *(List Price: $35 for disk and manual; $1 for manual only)*

Requires: 48K minimum, one disk drive, monochrome display.

McClain Software
P.O. Box 383
Turnersville, NJ 08012
CIRCLE 613 ON READER SERVICE CARD

Form Writer

A business program that was designed to work with the PC and the Diablo 630 printer.

The program is a combination data base management/mail merge/word processing package. The *Form Writer* sends a 9600 baud and can work on a parallel cable. The program can be used to send out a form letter to several hundred different names and addresses. Users can selectively batch those names from a master file of names.

The word processor uses the word processing capabilities built into the Diablo 630. The PCs function keys are used as on/off keys for underlining, right justification, bold printing and centering. *(List Price: $275)*

Requires: Diablo 630 printer.

Business Development International
P.O. Box 329
Third & Rollette
Pembina, ND 58271
(204) 837-8509
CIRCLE 611 ON READER SERVICE CARD

BDI Form Writer

Designed for use with the Diablo 630 printer, the *BDI Form Writer* reproduces standard forms, allowing the user to insert up to 14 types of information onto a selected form. This program can be used to create customer or prospect mailing lists, information mailers, invoices, purchase orders, and promotional letters. It also performs word processing and mail merge functions. *(List Price: Information available from the manufacturer.)*

Requires: Information available from manufacturer.

Business Development International
P.O. Box 329
Third and Rollette
Pembina, ND 58271
CIRCLE 530 ON READER SERVICE CARD

NGS FORTH

A programming package that uses the DOS file system to enable programs and data to be read from or written to DOS files. It provides an environment save and reload, which can be used to load large vocabularies. An autoload screen boot allows the program to load any disk screen at system start-up.

NGS also provides three debugging aids: a decompiler that provides immediate decompilation of colon definitions, a locator that reports the screen number from which a FORTH word was loaded, and a tracer that allows real-time monitoring of an application's execution. *(List Price: $66, includes manual)*

Requires: Information available from manufacturer.

Next Generation Systems
P.O. Box 2987
Santa Clara, CA 95055
CIRCLE 528 ON READER SERVICE CARD

The C.B.S. System, Convalescent Business Systems



LIBBY

A menu-driven, automatic library-management program that catalogs files and programs on disks. The program scans each disk directory, generates a sorted master file, and retains the file. It uses the master file to identify the disk that contains the desired file or program, to list the complete directory of any disk on the video display, and to send a report of the master file to either the video display or the printer in file name or disk order. *(List Price: $49.95)*
Requires: DOS, 48K RAM, one disk drive, 80-column video display, 80-column printer (optional).
Advanced PC Systems
608 Lisa Way
Campbell, CA 95008
(408) 243-1925
CIRCLE 527 ON READER SERVICE CARD

Microcourse

A software program that provides a computer-assisted instructional system in reading and language arts for elementary and junior high school students. Each student receives individualized practice and testing, and the teacher is informed which students need additional instruction in particular skills.

The Microcourse Reading program helps students master the basic reading skills most commonly taught in grades three through eight. The Language Arts program covers 488 skills in grammar, usage, and mechanics *(List Price: $39.75 per disk for 5 or less; $18 for back-up disk)*
Requires: 64K, keyboard, 5¼-inch floppy disk drives and interface, DOS, monochrome video display and adapter.
Houghton Mifflin Co.
1 Beacon St.
Boston, MA 02108
(617) 725-5213
CIRCLE 531 ON READER SERVICE CARD

CompuMedic/HD

A complete series of programs designed for doctors. Features include personal and transaction data management, accounts receivable, delinquent account handling, full insurance processing, recall, practice analysis, and full report capability. It also allows for the transfer and restoration of inactive patient files to floppy disks; word processing fully integrated with the patient data base; and information on referring doctors. *(List Price: Information available from manufacturer)*
Requires: 128K, one disk drive, DOS, 132-column printer.
Data Strategies, Inc.
332 South Juniper St., #210
Escondido, CA 92025
(619) 489-9218
CIRCLE 532 ON READER SERVICE CARD

DentalWare/HD

A complete series of programs designed for dentists. This system provides personal and transaction data management, accounts receivable, delinquent account handling, full insurance processing, recall, practice analysis, and full report capability. It also allows for transfer and restoration of inactive patient files to floppy disks; word processing fully integrated with the patient data base; and information on referring doctors. *(List Price: Information available from manufacturer)*
Requires: 128K, one hard disk, DOS, 132-column printer.
Data Strategies, Inc.
332 South Juniper St., #210
Escondido, CA 92025
(619) 489-9218
CIRCLE 533 ON READER SERVICE CARD

TurboFile

A BASIC program for *VisiFile* users with 17 extra commands for file access and report writing. It can access up to ten *VisiFile* files simultaneously; Get, Replace, Add, Delete, or Undelete by full key, partial key, or record number. The user can write BASIC programs free form, using statement labels instead of line numbers. *(List Price: $195)*
Requires: 128K, two disk drives, MS-DOS.
Creative Computer *Applications, Inc.*
P.O. Box 7074
Nashua, NH 03062
(603) 888-6648
CIRCLE 534 ON READER SERVICE CARD

Telelcomm Kriegspiel

A program that enables a PC to act as the referee for *Kriegspiel*, a variant game of chess in which neither player knows his opponent's moves except as they can be inferred from contact during play.

The referee program ensures that the moves obey the rules of chess and announces captures, checks, pawn tries, etc. It includes software to handle communications with any terminal connected to the host PC via a standard asynchronous interface, including a telephone connection. A selectable option allows both players to enter moves in turn at the host PC. Graphic displays show each player his position during the game, and the program can provide a post-game playback of the master board for insight into the strategies used. Runs under BASIC. *(List Price: $59.50 for diskette with program, operating instructions, and rules of play)*
Requires: 64K, one disk drive, monochrome display, asyncronous communications adapter, and modem (if telephone link is used).
Ladera Associates
5134 Corning Ave.
Los Angeles, CA 90056
(213) 292-4924 or 204-0719
CIRCLE 614 ON READER SERVICE CARD

New On The Market

Info-SORT

A program that sorts data records in desired sequences. The sort function allows selection of records within a file, which can then be extracted and sorted. The program is written in Assembler language and can read and sort 1,000 records in less than ten seconds. *(List Price: $95)*
Requires: 64K, DOS, two disk drives.
LM Systems, Inc.
1340 E. Katella Ave.
Anaheim, CA
(714) 937-1641
CIRCLE 535 ON READER SERVICE CARD

Info-REPORTER

A report writer that uses multiple relational data files to quickly produce comprehensive reports and special forms. A printer spacing chart is shown on the display screen to allow users to position information and define its contents. The sequence definition function allows information to be accessed and reported in multiple sequences within the same report. A report definition function provides multiple headings, footings, detail lines, calculations and subtotals. *(List Price: $125)*
Requires: 64K, DOS, two disk drives.
LM Systems, Inc.
1340 E. Katella Ave.
Anaheim, CA
(714) 937-1641
CIRCLE 536 ON READER SERVICE CARD

Info-GEN

A record management system and applications generator that allows users to build a complete, customized, menu-driven application. The system can be used to define files, entry and update screen formats, calculations, and report or label formats. Definition of data files are provided, with automatic editing features for minimum and maximum field values and required entry information. Entry or update screen formats may be generated automatically or customized by using the flexible custom screen format function. *(List Price: $245)*
Requires: 64K, DOS, two disk drives.
LM Systems, Inc.
1340 E. Katella Ave.
Anaheim, CA
(714) 937-1641
CIRCLE 537 ON READER SERVICE CARD

Universal Report Facility

A program that allows the programmer to generate a universal report writer in BASIC language. The resulting program makes it possible for someone with clerical skills—no programming required—to generate customized reports on stock paper, labels, or the screen.

Fields can be placed on the report in any order across the page. The report can have variable column widths, and can be sorted on any field. It can be selective, excluding certain records based on upper and lower limits. All of these factors are determined by the operator using the generated program, not the programmer. *(List Price: $150)*
Requires: 128K, one disk drive, a parallel or serial printer.
Fogle Computing Corp.
P.O. Box 5166
357 E. Blackstock Rd.
Spartanburg, SC 29304
(803) 574-4950
CIRCLE 538 ON READER SERVICE CARD

Screen Design Facility

A programming utility used to develop screen display and data entry subroutines. The code generated adds full screen data entry to a user's programs. The program displays a protected "mask" and data is entered through alphanumeric "windows" in this mask. Insert, delete, erase to end of field, and other functions can be used within the windows; the forward and back tabs move from window to window. All of the generated code is in BASIC and can be changed if desired. *(List Price: $150)*
Requires: 64K, one disk drive.
Fogle Computing Corp.
P.O. Box 5166
357 E. Blackstock Rd.
Spartanburg, SC 29304
(803) 574-4950
CIRCLE 539 ON READER SERVICE CARD

CHRIS (complete human resource planning and information)

A menu-driven, on-line, interactive system designed to be used by human resource managers and planners. The program consists of several modules related to traditional human resource information systems (HRIS) areas, including General Administration, Compensation, Benefits, EEO, Attendance Control, Recruiting and Employment, and Training and Development. Other modules address the planning aspects of human resource management, such as Human Resource Planning, Career Planning, Organization Planning, and Forecasting and Modeling.

All modules have full-screen edited input and a variety of standard reports. An optional report writer allows the user to produce "ad hoc" reports without any knowledge of programming languages, and interfaces with an optional word processing module to generate mailing labels, form letters, and personalized letters. An optional statistical reporter produces two-way tables and other statistics from the CHRIS database. *(List Price: Information available from manufacturer)*
Requires: Information available from manufacturer.
GAI Systems
699 rue St. Francois
Florissant, MO 63031
(314) 831-6464
CIRCLE 842 ON READER SERVICE CARD

Bond Swap Analyzer

A program that analyzes the profitability of bond swaps under various market conditions and using various assumptions. Up to ten bonds on either side of the swap can be handled. The program computes the yield or price, duration, and accrued interest on each bond. The user can designate the income reinvestment rate and the horizon date yields. Net cash flows, profitability, and realized rates of return are displayed for each set of assumptions.

The program will also calculate break-even reinvestment rates, horizon yields, and spreads on each swap to determine the market conditions that would make each swap profitable. Reports can be presented in hard copy or on the screen. The package includes thorough documentation. *(List Price: $675)*

Requires: 128K, one 2-sided disk drive.

Technical Data
Financial Software Division
One Post Office Square
Boston, MA 12109

CIRCLE 540 ON READER SERVICE CARD

Yield Calculator

A program that calculates the yields on a wide variety of bonds, including government, corporate and municipal bonds; interest-at-maturity notes, discount and interest-bearing money markets; and dated bonds with odd first coupons.

Each calculation includes the yield to maturity, yield to call, and current yield, and a range table of up to 39 yield/price calculations can be displayed. True yields are automatically calculated for securities maturing on weekends or for dated bonds with short or long first coupons. *(List Price: $375)*

Requires: 128K, one 2-sided disk drive.

Technical Data
Financial Software Division
One Post Office Square
Boston, MA 02109

CIRCLE 541 ON READER SERVICE CARD

DISK MECHANIC

A software product designed to analyze, back up, preserve, repair and modify disks.

Using the program, the physical location of each file on a disk can be determined, and any byte of any sector or file may be examined or changed. Hidden files can be disclosed and deleted files restored.

Among other features, the program checks the RPM of any disk drive, modifies FDC parameters, and issues a report on anything it finds out of the ordinary.

The program is self-contained and comes with a detailed technical manual. *(List Price: $69.95 plus $3 shipping)*

Requires: 128K.

MLI Microsystems
P.O. Box 825, Dept. PR
Framingham, MA 01701
(617) 926-2055

CIRCLE 543 ON READER SERVICE CARD

PROMED

A comprehensive Billing, A/R & Collection system for the Medical Office. Designed to minimize clerical tasks, improve cash flow and maximize collections.

A scheduling system manages the preparation and submission of insurance claims and patient billings, and includes features to assist in follow-up and disposition of overdue accounts.

Other features include name-oriented patient records, direct real-time transaction posting, and daily to monthly audit trails. *(List Price: $4,000)*

Requires: 128K, hard disk, PC-DOS, printer.

Prose Software Systems
1503 Nora Dr., #F
Arlington, TX 76013
(817) 261-4439

CIRCLE 544 ON READER SERVICE CARD

FilePlan

An electronic filing system designed to facilitate data entry. Multiple records may be viewed simultaneously, and existing records provide examples for data entry.

The system's records can contain up to 2,048 characters in 32 variable-length fields of 99 characters each. Binary-tree indexing keeps records in proper sequence, automatically updating the sequence as records are added, deleted, or modified.

The system operates with the CP/M system and supports both the 8- and 16-bit versions. *(List Price: $295)*

Requires: 64K, two floppy disk drives with at least 150K of storage per drive.

Chang Labs
5300 Stevens Creek Blvd.
San Jose, CA 95129
(408) 246-8020

CIRCLE 546 ON READER SERVICE CARD

New On The Market

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A new version of the *LISP* artificial intelligence language. Features include recursive functions, macro functions, PROGs, multiple display window support, multi-dimensional arrays, unlimited precision integers, and 8087 support. Over 150 primitive functions are defined in assembly language.

A library of functions defined in *LISP* provides structured-programming language extensions and support for editing, formatting and debugging. *(List Price: $125 includes manual)*

Requires: 128K, one disk drive.

Integral Quality
P.O. Box 31970
Seattle, WA 98103-0070
(206) 527-2918
CIRCLE 545 ON READER SERVICE CARD

ACCESSORIES

PC-COMPANION

A pocket-sized reference card that lists all 255 ASCII codes. It depicts the ASCII code and the corresponding control code or the special symbol available on the PC. *(List Price: $1 each; discounts for quantities available)*

D^2 Enterprises
P.O. Box 871
Shalimar, FL 32579
(904) 651-3108
CIRCLE 690 ON READER SERVICE CARD

Personal Computer Desk

An adjustable desk designed for home use. The Personal Computer Desk is constructed with a 1¾-inch tubular steel frame with extra-large, hook-on work surfaces that can be raised and lowered to position the keyboard and VDT for any operator regardless of chair height. *(List Price: $240, shipping not included)*

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1314 S. Main
P.O. Box 1871
Elkhart, IN 46515
(219) 522-3498
CIRCLE 683 ON READER SERVICE CARD

Personal Computer Desk, O/I Inc.





The Lifeline, Instrumentation and Control Systems, Inc.

The Lifeline

An uninterruptible AC power supply designed to furnish voltage regulation and line filtering at all times. The Lifeline also includes an inverter that supplies power only during power outages with no interruption to the critical load.

A maintenance-free internal battery handles the full power of the system for five or ten minutes. Recharge to 95 percent of the full charge requires about 40 minutes.

A larger bank of batteries can be used to extend operation for several hours. The Lifeline plugs into a normal 120 VAC Wall outlet while the critical load is plugged into the dual convenience outlet on the UPS. *(List Price: $1,042)*

Instrumentation and Control Systems, Inc.
520 Interstate Rd.
Addison, IL 60101
(312) 543-6200
TWX 910-991-5945
FAX (312) 543-5250
CIRCLE 685 ON READER SERVICE CARD

IBM PC-Compatible Parallel Printer Cable

A cable that connects the PC with the Epson MX-80 or other printers using similar Centronics type interfaces.

The five-foot cable has gold-plated contacts to increase conductivity. Connectors are Winchester #49-1125P and Cinch/Amphenol 57-30360. Extra cable lengths are available. *(List Price: $35 postpaid; $45 postpaid overseas; additional lengths $7.50 per five feet)*

Austin Computer Technologies
P.O. Box 26595
Austin, TX 78755
(512) 835-6136
CIRCLE 687 ON READER SERVICE CARD

PC Stand

A system unit stand designed to provide users with more storage space.

The PC Stand provides room for users to store the keyboard out of the way under the system unit. The stand also allows the keyboard cable to be routed under the system unit eliminating the need for extension cables and raises the monitor for better viewing.

The stand measures 22 inches wide, by 3 inches high, by 14 inches deep. *(List Price, $34.95 plus $2 for mail orders)*

Personal Computer Accessories
4456 Partridge Ct.
San Jose, CA 95121
(408) 578-7798
CIRCLE 686 ON READER SERVICE CARD

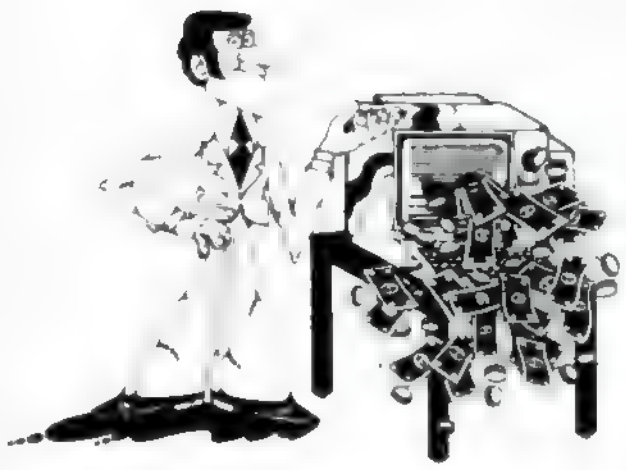
PC LOCK

An individually-coded chip for installation in a PC to prevent access to the computer by unauthorized persons. Each time the system is rebooted or the user activates the lock from the keyboard, the computer will not perform any function until a password is entered. Available with a factory-assigned password or with a custom chip. *(List Price: $99 to $149)*

MPPi, Ltd.
1126 Adirondack
Northbrook, IL 60062
(312) 480-9730
CIRCLE 688 ON READER SERVICE CARD

PC Stand, Personal Computer Accessories





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CIRCLE 238 ON READER SERVICE CARD

EDITED BY SUSAN HURLEY

Clubs, bulletin boards, and newsletters enable PC users to capitalize on their fellow users' knowledge.

Club News

ALASKA

The fledgling Anchorage Users Group would like to receive tips, hints, and advice from other groups on how to organize.

According to member Mark Bolzern the group is having difficulties getting established and attracting newcomers. Current members would like to provide a newsletter and a bulletin board but need advice on how to start these projects.

Letters should be sent to the Anchorage User Group, c/o General Computer Services, 213 W. Sixth Ave., #11, Anchorage, AK 99501. Attn: Mark Bolzern.

ARKANSAS

The Razorback PC Club of Little Rock would like to hear from fellow user groups to set up an information and software exchange.

The club meets on the first and third Monday of the month at the First Federal Building in Little Rock. Dues are $15 per year.

According to member Wally Anderson membership is growing rapidly. The club was established to help foster communications between PC users and others interested in the PC.

For more information about the club contact: Wally Anderson, 3000 Cleburne St., North Little Rock, AR 72116, (501) 758-0148.

CALIFORNIA

Adventures Anonymous is a new club which provides members an opportunity to buy, sell, or trade user-constructed, non-commercial programs through a bimonthly newsletter.

Membership is open to anyone interested in the PC. A 1-year membership is $59.95; members receive a game and an adventure disk upon joining. Subsequent dues are $34 per year.

Members can advertise their "adventures" or programs in the club's newsletter for 25 cents per word up to a maximum of 120 words per issue.

The club library currently contains several user-developed adventures and games which are available to members. For further information contact Input Investments, P.O. Box 8286, Rancho Santa Fe, CA 92067.

The IBM PC Club of San Francisco will include a "bulletin board" in every newsletter. The "board" will carry notices of computerware members want to buy or sell.

Club member Max Brioski wants to expand the bulletin board to include personal announcements and paid advertisements. Brioski encourages other PCers to contact him in care of the club at 1880 California St., #12, San Francisco, CA 94109 (415) 775-8882 with "suggestions, ideas, proposals (and) interests."

Word comes from Diablo Valley that a new group, the Diablo Valley PC (DVPC) has been formed to serve the needs of PC owners in the Walnut Creek, Pleasant Hill

and Concord areas.

The group will hold monthly meetings and currently provides members with a newsletter, special interest groups, a library and a resource list. Newcomers are invited to attend meetings. Contact Alfred Hunt, c/o Diablo Valley PC, P.O. Box 23764, Pleasant Hill, CA 94523 (415) 687-8037.

COLORADO

The Colorado Springs area is home to a new user group. The group is still in the formative stage but plans are underway to elect officers, publish a newsletter and set up a software exchange.

Further information about the new group is available from Cleveland L. Bell, 17665 Shahara Rd., Monument, CO 80132 (303) 488-3049.

HAWAII

The address for the Hawaii user group has been changed. The new address is:

Hawaii IBM PC Users Group, P.O. Box 22967 Honolulu, HI 96822.

Meetings are held the second Tuesday of the month. Contact Doug Long in care of the club.

MARYLAND

A logo contest is being sponsored by the Baltimore IBM Personal Computer Users Group. The logo will be used on the group's newsletter, *I/O News*. The winner will receive a free 1-year membership. Sketches should be sent to Bob Ebersol, 2603 Bradenbaugh Rd., Whitehall, MD 21161.

Advertisements are now being accepted for *I/O News*. Rates are $20 for a full page, $10 for a half page, and $5 for a quarter page. *I/O* provides user tips, meeting updates, and notes on member-owned computerware for sale or purchase.

OHIO

Another new group, the Western Reserve IBM Personal Computer Association (WRIPCA) was recently formed in Warren, Ohio.

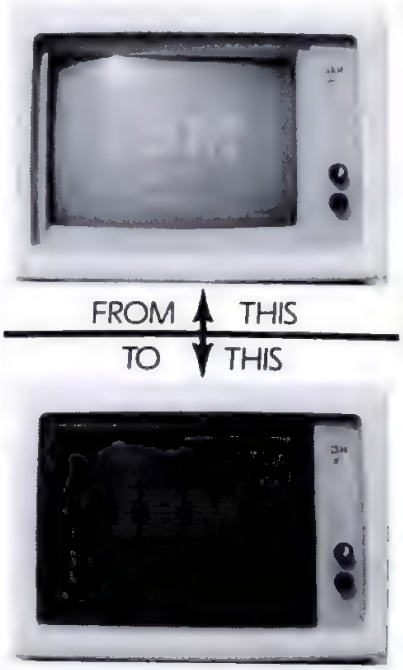
The purpose of the group is to answer questions, concerns, and needs of PC users in the area.

The group meets at 7p.m. on the second Tuesday of the month at the Computer-Land in Warren. Meeting agendas include a guest speaker every month and a discussion of member concerns and problems.

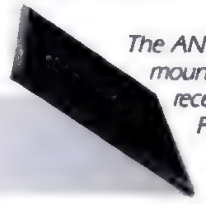
A public domain library of software, product reviews and articles is available to

PC will publish a periodic listing of PC user groups and their activities. Drop a line to Club News, PC, One Park Ave., New York, NY 10016.

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"An intriguing account of the breakthroughs and breakdowns of the adult mind as it plunges into the advancing microworld. Sudnow shows us an exciting way to relate to approaching computer technology."

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—Hubert Dreyfus, Author of *What Computers Can't Do*

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Club News

members. Dues go to support the library and the club's newsletter. Anyone wishing to join or exchange software should contact the WRIPCA, c/o Larry Cavin, ComputerLand, 2000 North Rd. SE, Warren, OH 44484.

INTERNATIONAL

The PC Association of Canada recently became affiliated with the international Personna Computer Association, Inc. of New Jersey. The two groups want to foster a better exchange of information between Canadian and American PC users.

An international PC trade show is being organized under joint sponsorship. The show is slated for September 9-10 at the Skyline Hotel in Toronto.

PCA is currently affiliated with a German PC user group and is looking to set up contact with a users group in Norway. Both PCA and Personna members hope affiliation with other groups will occur as PC use grows worldwide.

For further information about PCA, membership, or the trade show, contact PCA, P.O. Box 251, Ajax, Ontario L1A 3C3, Canada.

PC User Groups

This list provides the names and addresses of PC User Groups worldwide. You can check this list to locate other PC aficionados in your area.

ALABAMA

Birmingham User Group
Chet Ellis
ComputerLand
215 W. Valley Ave.
Birmingham, AL 35209
(205) 942-8085

ALASKA

Anchorage User Group
Mark Bolzern
c/o General Computer Services
213 W. 6th Ave. #11
Anchorage, AK 99501

ARIZONA

The Phoenix IBM PC Users Group
Fred Linch
P.O. Box 44218
Phoenix, AZ 80564
(602) 954-7519

IBM PC Idea Exchange
Lisa May
United Systems Corporation
1074 E. Sandpiper Dr.
Tempe, AZ 84283
(602) 831-9363

IBM PC User Group
Theresa Baudier
P.O. Box 1489
Tucson, AZ 85701
(602) 622-4751

CALIFORNIA

San Diego IBM User Group
Michele Albright
4005 Isle Dr.
Carlsbad, CA 92008
(714) 434-1608

San Diego Computer Society
John Field
1384 Caliente Loop
Chula Vista, CA 92010
(714) 421-9686

IBM PC User Group
Lee Wersel
7255 Orchard Dr.
Gilroy, CA 95020

Beach Cities IBM PC Users Group
Phil Root
6242 Moonfield Dr.
Huntington Beach, CA 92648
(714) 847-6369

Modesto-Turlock PC User Group
Liz Leedom
Box 1122
Modesto, CA 95353
(209) 523-4218, 578-2358

IBM Users Group of California
Neil Zachary
P.O. Box 4136
Los Angeles, CA 90028
(213) 937-1314

Business Computer
Users Group
David Nussbaum
40 Software Central, 650 East
Colorado Blvd.
Pasadena, CA 91101

Diablo Valley PC
Alfred Hunt
P.O. Box 23764
Pleasant Hill, CA 94523
(415) 687-8037

Adventures Anonymous
Michael Eddy
P.O. Box 8286
Rancho Santa Fe, CA 92067

Cubic Computer Club
Pete Nelson
P.O. Box 80787
San Diego, CA 92138
(714) 453-4953

San Francisco IBM PC User Group
Alfred Goodwin
Software Center
4720 Geary St.
San Francisco, CA 94118
(415) 751-2231

U.C. San Francisco User Group
Bruce Stegner
UCSF U-76
San Francisco, CA 94143
(415) 666-1409

PC Club
Max Brioski
1880 California St. #12
San Francisco, CA 94109
(415) 775-8882

Bay Area User Group
Christian Du Lac
P.O. Box 155
San Francisco, CA 94101
(415) 668-4647

Santa Barbara City College Computer
Science Department
Stu Swartz
721 Cliff Dr.
Santa Barbara, CA 93109
(805) 966-2919

Silicon Valley Computer Club
Peter Harris
510 Lawrence Expressway
P.O. Box 686
Sunnyvale, CA 94086
(408) 248-9057

San Fernando Valley Club
Al Saavedra
4785 Morro Dr.
Woodland Hills, CA 91364
(213) 347-9495

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ReadiWriter comes with two manuals: a tutorial, and a 100+ page reference manual; they are available together for $30 with full credit given if ReadiWriter is ordered within 60 days. There is a separately priced Advanced Users Manual.

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4K Buffer Serial Only
DAISYWRITER 1500 P $925
4K Buffer Parallel Only

IDS
PRISM 80 ..... $1,046
Includes 3.4K Buffer and 200 Sprint.
PRISM 80 ..... $1,245
Includes 3.4K Buffer, sheet feed, Sprint 200 CPS and graphics.
PRISM 80 ..... $1,445
Includes 3.4K Buffer, sheet feed, Sprint 200 CPS, graphics and color.
PRISM 132 ..... $1,606
Includes all of above.

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Prowriter (Serial) $629
Prowriter 2 (Parallel) $719
Prowriter 2 (Serial) $769
Starwriter F-10 ..... $1,449
Printmaster F-10 ..... $1,699

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Rana Elite I $305
Micro-Sci $289

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Club News

Peninsular IBM PC Users Group
c/o Friendly Software Corp.
376 El Camino Real
San Carlos, CA 94070

Thousand Oaks Personal Computer Club (TOPCC)
c/o ComputerLand
171 E. Thousand Oaks Blvd.
Thousand Oaks, CA 91360

COLORADO

Denver User Group
Steve Leibson
4040 Greenbriar Blvd.
Boulder, CO 80303
(303)494-4062

PC Users Group
Cleveland L. Bell
17665 Shahara Rd.
Monument, Colorado 80312
(303) 488-3049

CONNECTICUT

IBM Personal Computer User Club of Stamford
Dave Foulger
69 River St.
New Caanan, CT 06840
(203) 966-9378

Central Connecticut User Group
Rich Paterson
ComputerLand
131 S. Main St.
West Hartford, CT 06110
(203) 561-1446

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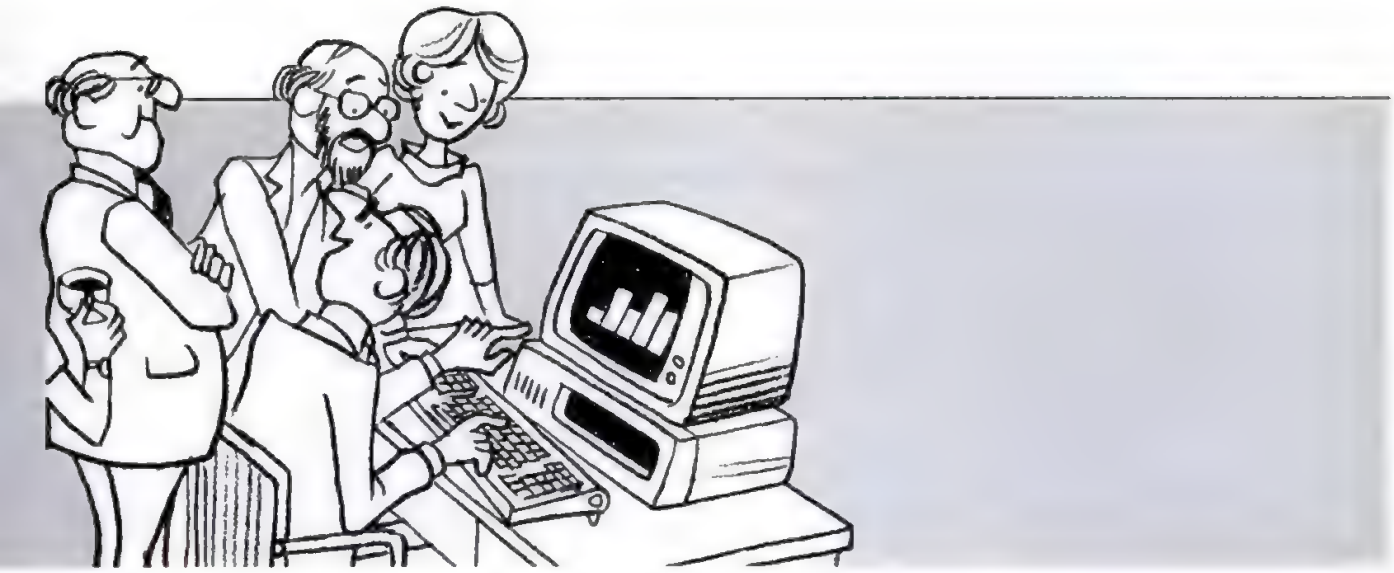
Honolulu IBM PC Users Group
Doug Long
P.O. Box 22967
Honolulu, HI 96822

IDAHO

Idaho PC User Group
Bruce Burns
ComputerLand
687 S. Capitol Blvd.
Boise, ID 83702
(208) 344-5545

ILLINOIS

Autumn Chapter User Group
James L. Szafranski
5195 Castaway Ln.
Barrington, IL 60010
(312) 934-8133



INDIANA

ComputerLand User Group
Susan Shields
ComputerLand
5450 N. Coldwater Rd.
Fort Wayne, IN 46825
(317) 259-7892

Northern Indiana IBM PC Users Group
Dr. Terry Alley
316 N. Ironwood Dr.
South Bend, IN 46615
(219) 289-5506

IBM PC User Club
Jo Spangler
Microbase Software, Inc.
P.O. Box 40353
Indianapolis, IN 46240
(317) 877-4304

South Bend PC Club
Thomas R. Lafree
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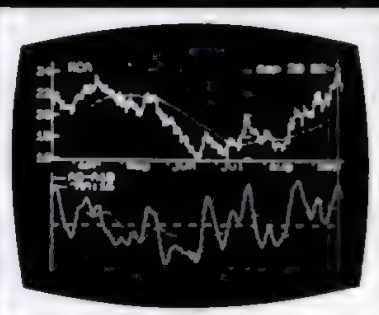
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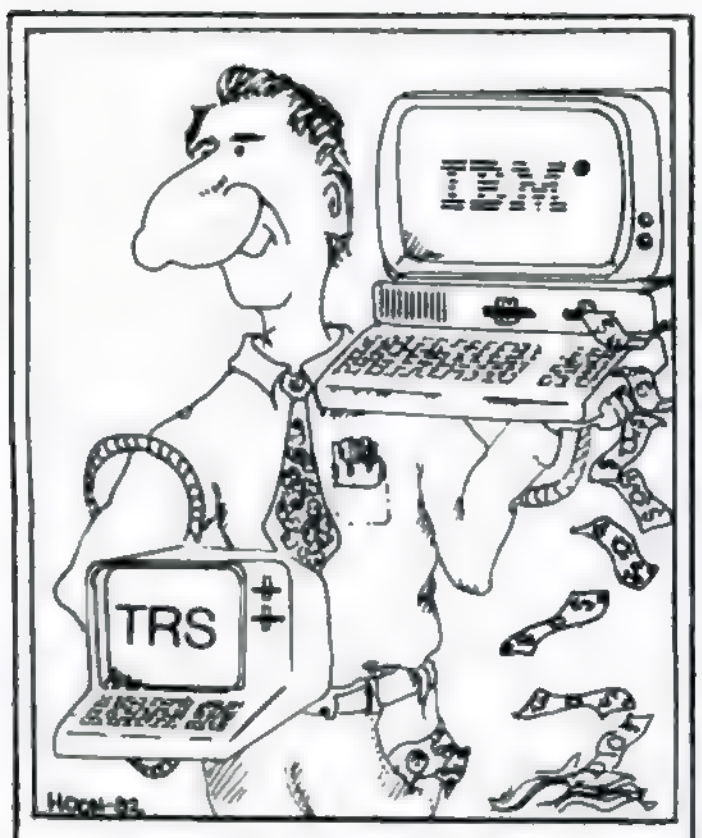
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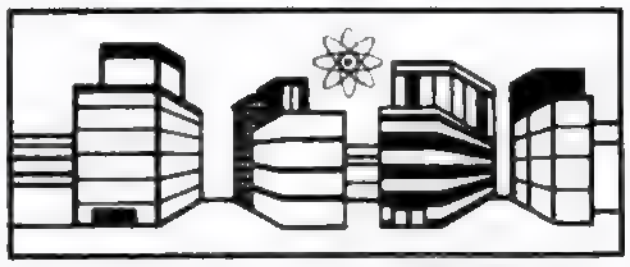
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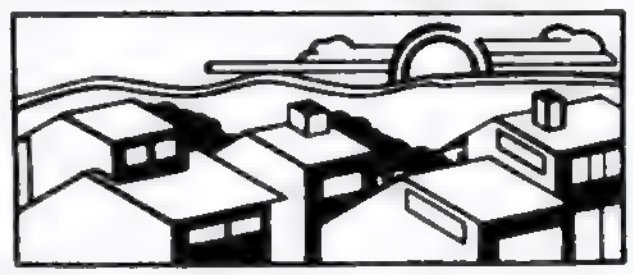
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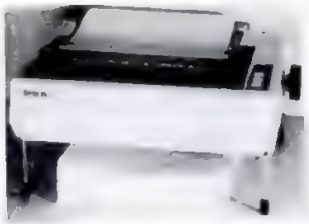
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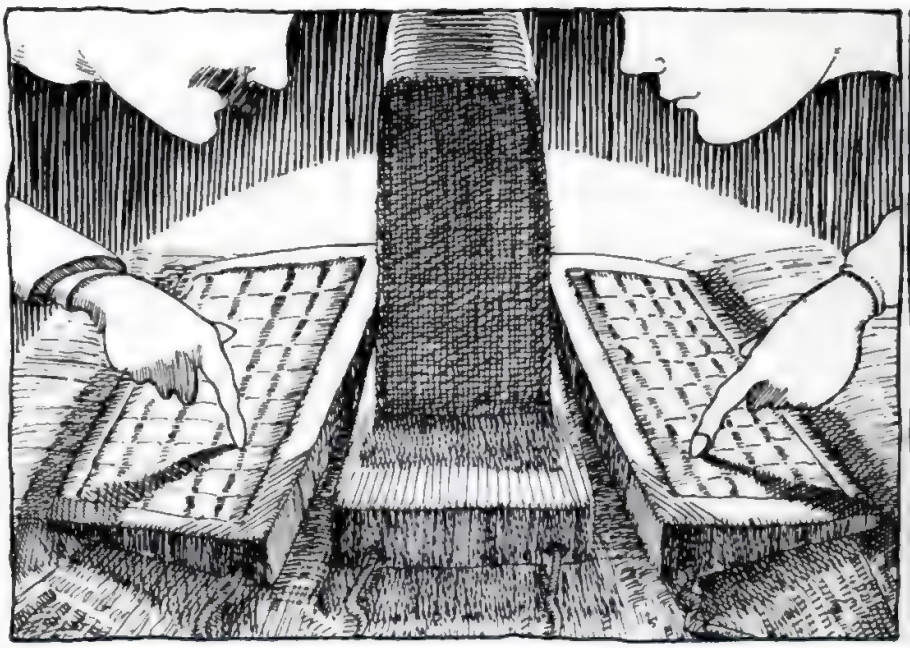
PC readers pass on their programming tips and tribulations.

User-To-User

Did you ever hear the one about the fish heater that went away? Mel Peterson contributes the solution to an aquatic mystery which is very appropriate to a topic in this issue: electrical interference. I recognized his plaint immediately, since it was a problem I had to deal with in setting up my own home office. My writing room is upstairs in our house, and heating bills can rise very quickly in wintry upstate New York. To make a long story short, my PC took electrical umbrage at a small space heater plugged into the same line in the office. I already had a surge protector and line filter installed, but the monitor screen still shrank, the disk drives still groaned, and the fan still hiccupped each time the heater came on. I decided I couldn't type very well in mittens—the solution was to install a dedicated electric line for the heater.

Moving from fish to glue, several readers wrote to suggest ways to add home row bumps to the IBM keyboard. If you use Fredric Wilson's way, just be ***very*** *careful not to get the stuff between the keys or into the electronics of the board. Perhaps, even as we sit here now, some manufacturer is hard at work on producing replacement key cap covers.*

Other suggestions this month are no less exceptional: how to pick up a bit of speed in FOR . . . NEXT loops, how to change colors in high resolution modes, and how to make your BASIC statements come to front and center.



Out of Colors?

The IBM PC high-resolution mode actually supports only one color: white. By sending a value to hexadecimal address 3D9, it is possible to select one of eight colors for a direct-drive color monitor and 16 colors for sets with intensity modification. By converting the hexadecimal value to decimal and using BASIC's OUT statement to send a value to the corresponding output port, one can select any color in the high-resolution mode.

To change the color of text and graphics while in the high-resolution mode, include the following statement in your BASIC program:

```
OUT 985,X
```

where X equals color desired from 1 to 15.

IT IS POSSIBLE to select one of eight colors for a direct-drive color monitor.

This change will remain in effect until a WIDTH or SCREEN statement is executed. Remember that you must be in Screen 2 mode when executing this statement.

Steven Lombardo
Huntington Bay, New York

Bumping Your Keyboard

In the "Wish List" of Volume 1, Number 8, a reader asked for "home row" bumps to help touch typists. Here's a little hint.

Place a drop of Elmer's glue on the top of the F, J, Return, and Shift keys, and the number 5 on the keypad. When the glue dries, it produces a small transparent bump that is easily felt with the fingertips. The glue does no damage to the keys and can be removed with a fingernail.

An alternative would be to place a drop of glue on each of the "caution" keys, those that so often cause problems when struck accidentally—CapsLock, PrtSc, the Backslash, and NumLock.

GLUE DOES no damage to the keys and can be removed with a fingernail.

Fredric Woodbridge Wilson
Neptune, New Jersey

A Fishy Story

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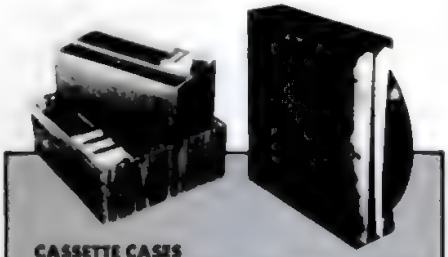
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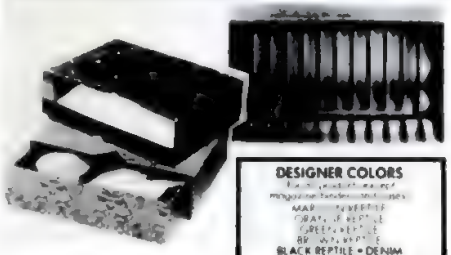
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half hour or so, one or more characters mysteriously appeared on the screen.

THE CONCLUSION I came to was that my problem was unique to the environment in which I was using the PC.

This quickly became very frustrating, since the keystrokes were often function keys including Tron, Cont, and others.

The service department at the place I bought my computer was very helpful but, unfortunately, unable to solve the problem. They tried replacing the keyboard (an obvious first attempt), then replaced the system board, and finally replaced the remaining components in the system unit (power supply, disk drive, disk adapter and mono/printer adapter).

Having made six trips back to the store for service, I decided to call IBM's service department. I described my problem, and they called back later with the advice that I should mail my keyboard to IBM in Illinois!

Since my entire system had been replaced, piece by piece, the conclusion I came to was that my problem was unique to the environment in which I was using the PC.

My first thought was of static electricity. This didn't seem a likely cause, however, since there are no rugs or carpets in the room and a humidifier keeps the relative humidity at a reasonable level. The next consideration was the power source. There were no obvious surge problems with the refrigerator or other appliances. I had noticed some interference in a TV picture at times, though, so I decided to see if I could isolate that problem.

The problem turned out to be caused by a heater in a tropical fish tank. As the heater's switch fluttered between on and off states, it interfered with everything on the line. With the heater unplugged, my PC experienced no problems.

Is the PC overly sensitive to this type of interference? If so, will IBM correct the problem, or will we PC owners have to buy external line filters?

I HAD noticed some interference in a TV picture at times.

Mel Peterson
Minneapolis, Minnesota

Coming Up to Speed

A BASIC program which contains long FOR–NEXT loops can gain a significant increase in speed if you omit the variable

Figure 1: A program to demonstrate the difference in running time when variable names are omitted from the NEXT statements in lines 180 and 190.

```
100 CLS
110 REM Time test for loops
120 PRINT "STARTING"
130 A=0:B=0:C=0:D=0:E=0:F=0:G=0:H=0:I=0:J=0:K=0
140 L=0:M=0:N=0:O=0:P=0:Q=0:R=0:S=0:T=0:U=0:V=0:W=0:X=0:Y=0:Z=0
150 ST$=TIME$
160 FOR Y%=1 TO 20
170 FOR Z%=1 TO 1000
180 NEXT Z%
190 NEXT Y%
200 SP$=TIME$
210 ST!=VAL(ST$)*3600+VAL(MID$(ST$,4,2))*60+VAL(MID$(ST$,7,2))
220 ST!=VAL(SP$)*3600+VAL(MID$(SP$,4,2))*60+VAL(MID$(SP$,7,2))
230 PRINT "START TIME =";ST$,"STOP TIME = ";SP$
240 PRINT "TOTAL LOOP TIME =";SP!-ST!
250 END
```

name on the NEXT statement (see IBM's BASIC manual, page 4-89).

Try the accompanying program (see Figure 1). I timed a run at about 28 seconds.

A BASIC program can gain speed if you omit the variable name on the NEXT statement.

Now remove the variable names in lines 180 and 190 so that they read only NEXT. Running the program should now take about 11 seconds—a real difference.

A tiny additional amount of time could be saved by putting the NEXTs on the same line. Another point to notice here is that the immediate variable type definition such as A% is just as efficient as the DEFINT A statement.

Terry Lundgren
Phoenix, Arizona

Front and Center

When writing programs in BASIC that require frequent centering of words, I employ a user-defined function that does the work painlessly. First I define the function:

```
DEF FNCEN$(V$,X) = SPACE$((X-LEN(V$))/2)+V$
```

Then whenever I want to center something on an 80-column display, I use the statement:

```
PRINT FNCEN$("Center This",80)
```

Simply put the words you want centered in quotes (in place of "Center This"), and change the second argument, 80, to 40 if you are using a 40-character screen.

Norris Boyd
Kingsport, Tennessee

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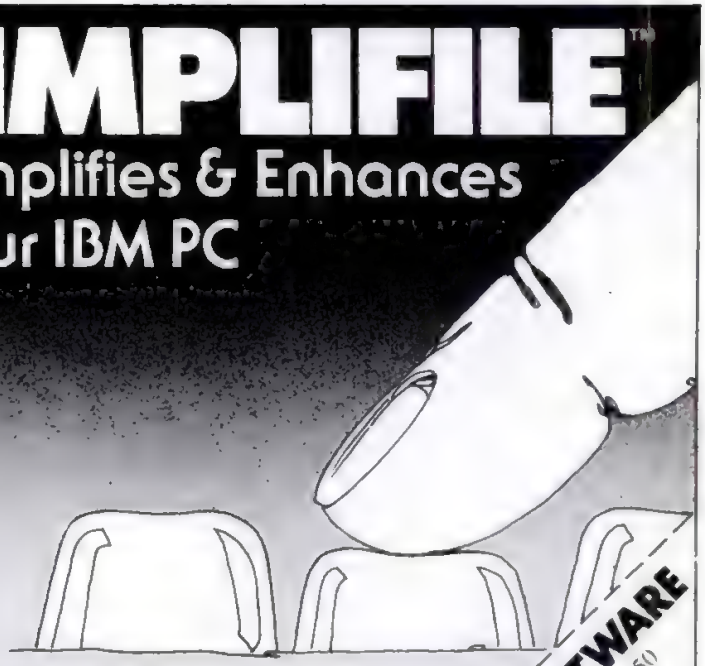
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Back To BASIC

Learning IBM BASIC For The Personal Computer
David A. Lien (CompuSoft Publishing Co., El Cajon, California, 1982) 425 pages, $19.95; ISBN #0-932760-13-9

David A. Lien has already entered the homes of hundreds of thousands of microcomputer owners through his demystifying handbooks, including The BASIC Handbook, Learning TRS-80 BASIC, *Radio Shack's* Level I User's Manual, *and all of the Epson MX printer manuals.*

His new book, excerpted here, translates into English the most common entry-level programming language for PC owners—IBM BASIC. We have selected three chapters (45, 46, 51) that deal with some of the more vexing elements of the language: Peeks, Pokes, and Debugging. Even if you are already familiar with these concepts, you will find Lien's explanations refreshingly lucid.

Peek and Poke

PEEK and POKE are BASIC words that allow us to do non-BASIC things. They provide the means whereby we can PEEK into the innards of the Computer's memory, and if we wish, POKE in new information.

It is not our purpose here to become an expert in machine language programming, nor on how the Computer works. We have to approach this and related topics a little gingerly lest we fall over the edge into a computer abyss (or is it an abysmal computer?). We do know, however, that computers do their thing entirely

by the manipulation of numbers. Therefore, when we PEEK at the contents of memory, guess what we'll find? Numbers? Very Good!

MEMORY MAP

Decimal Address	Hex Address	Function
0 65535	00000 0FFFF	UP TO 64K READ/WRITE MEMORY ON SYSTEM BOARD
65536 262143	10000 3FFFF	UP TO 192K MEMORY IN I/O CHANNEL
262144 655359	40000 9FFFF	384K FUTURE MEMORY IN I/O CHANNEL
655360 671743	A0000 A3FFF	RESERVED
671744 720896	A4000 B0000	GRAPHICS/DISPLAY MONOCHROME DISPLAY BUFFER
753664 786431	B8000 BFFFF	COLOR/GRAPHICS
786432 983039	C0000 EFFFF	192K MEMORY EXPANSION
983040 999423	F0000 F3FFF	RESERVED
999424 1048575	F4000 FFFFF	48K SYSTEM ROM

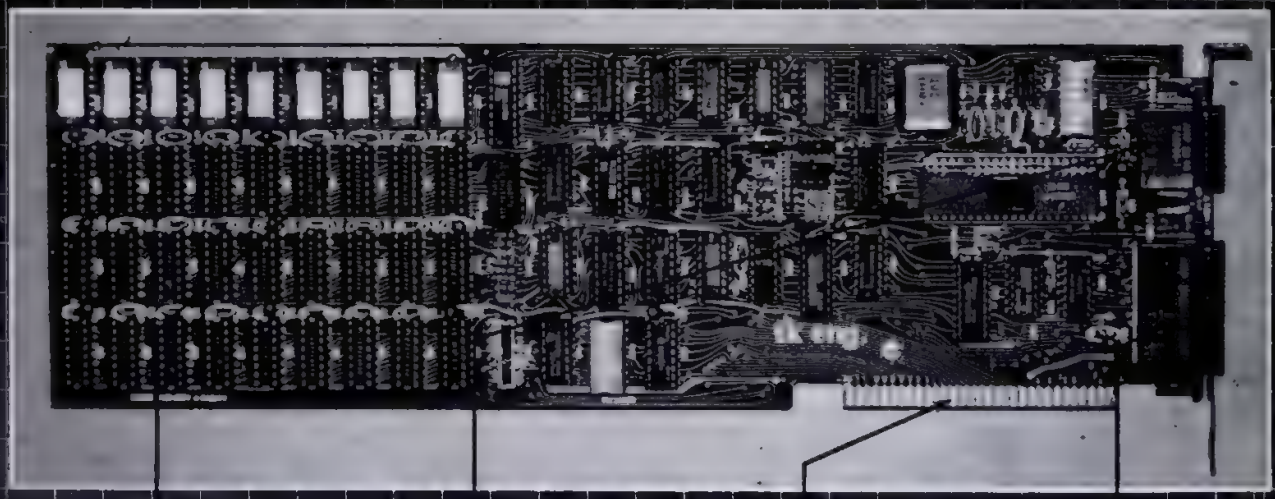
The Memory Map in Figure 1 shows that large chunks of the Computer's memory are reserved or "mapped" for very specific uses. The BASIC ROM for example, uses byte addresses 999424 through 1032192 (commonly referred to as 1 MEGabyte). All numbers we talk about here are decimals, not hex, octal, binary or Sanskrit.

The range of the numbers we can PEEK or POKE is 0 to 65535 (64K). But that's just our Read/Write user memory. We obviously have many more addresses than 0-65535. Our 16 bit IBM computer allows us to use up to 256K of memory (if we have it installed), beyond the range of our usual PEEK and POKE. In order to access these additional memory addresses, we use the DEF SEG statement. This statement DEFines the SEGment of memory that we will PEEK or POKE at a given time.

But it isn't as easy as it sounds. We must give the DEF SEG

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statement the address of the segment we want, divided by 16. When the DEF SEG statement gets an address, it automatically multiplies it by 16.

Turn the machine off to clear out memory, turn it back on, bring up BASICA and type in this NEW program:

```
5 DEF SEG = 62464!
2Ø N = 82ØØ
4Ø PRINT N, PEEK(N), CHR$(PEEK(N))
5Ø N = N + 1
7Ø GOTO 4Ø
```

Let's analyze the program before RUNning it.

Line 5 sets the SEGment of memory to the beginning of ROM. The actual highest absolute address is 62464 * 16 = 999424 (F4000 Hex).

Line 2Ø sets the beginning address where we want to start PEEKing. As Figure 1 shows, there are lots of good places to go spelunking, and we can change line 2Ø to start wherever we want.

Line 4Ø PRINTs three things:

A. The address—that is, the number of the byte, the contents of which we are PEEKing at (the offset into the SEGment).

B. The contents of that byte, expressed as a decimal number between 0 and 255.

C. The contents of that address converted to its ASCII character. (Many of the ASCII characters are not PRINTable. Go back to the Chapter on ASCII if your memory has grown dim.)

OK, now:

```
. . . RUN
```

the program, being ready to freeze it with Ctrl-Num Lock if you see something interesting. It can also be STOPped at any time with Ctrl-Break, and restarted with CONT Enter without having to start all over again with N at 8200.

Didn't see anything interesting? What did you find starting at address 9141? You have to be able to read vertically as the letters swish by.

Also, at address 8520 we see what almost looks like BASIC commands.

Change N to start at different places in memory and PEEK to your heart's delight. You can't goof up anything by just PEEKing. It's indiscriminant POKEing that gets us into trouble.

The command level is very handy for resetting the starting address. We can change the value of N by just typing: Ctrl-Break

```
N = 15ØØØ Enter
```

for example, then:

```
CONT Enter
(OR F5)
```

instead of RUN. When done PEEKing, and having seen far more information than can possibly be absorbed, rework Line 4Ø to read simply:

```
4Ø PRINT CHR$(PEEK)(N));
```

. . . and RUN.

It PRINTs only the ASCII characters, horizontally, and is the ideal program to RUN when friends visit. Just act casual about the whole display and avoid any direct questions. Makes a great background piece for a science fiction movie.

When you find an interesting spot, hit Break, then

```
PRINT N Enter
```

at the command level to find out where in memory we are PEEKing. (Don't you wish we could explore the corners of our minds as easily?) CONTinue on when ready. Having degenerated from PEEKing to leering, it's time to see what else we can do.

Careless POKEing Can Leave Holes . . .

Before POKEing, we'd better see that we're not POKEing a stick into a hornets' nest. It's with the greatest of ease that we destroy a program in memory by POKEing around where we shouldn't.

Obviously there is no use POKEing the ROM area since ROM stands for Read Only Memory. It's not changeable. The rest of the "Memory mapped" area, from 65536 thru 999424 is reserved for specific things, so best not to POKE in there while we're just bungling around. Anything above 4000 should be available memory, unless taken up with our BASIC program or required for processing. With such a short program as ours we surely can't goof anything up? Can we? Let's PEEK around 10000 and see if anything is going on there. Change these program Lines to:

```
5 DEF SEG
2Ø N = 1ØØØØ
4Ø PRINT N; PEEK (N),
```

. . . and RUN.

This default value of DEF SEG means set the segment to the beginning of where BASIC stores its programs. This may be as high as 25000 in Disk BASICs.

What we see are the address numbers and their contents, in easy-to-read parallel rows. Unless you've been messing around with other programs since power-up, you should just see nice rows of 0's. The memory at these locations is in "neutral", waiting to be used.

Great! Let's change our program and POKE in some information, then do something with it. Make it read:

```
1 REM * POKE PROGRAM *
5 DEF SEG
2Ø N = 1ØØØØ
3Ø READ D
4Ø POKE N,D
5Ø N = N + 1
6Ø IF N = 1ØØ11 THEN END
7Ø GOTO 3Ø
1ØØ DATA 8Ø,69,69,75,45,65,45,66,79,79,33
```

Before RUNning, let's analyze it. Line 5 sets the SEGment to the beginning of program storage. Line 2Ø initializes the starting address at 10000 Line 3Ø READs a number from the DATA Line Line 4Ø POKEs the DATA "D" into address "N" Line 5Ø increments the address number by one Line 6Ø ENDs execution after we've POKEd in all the DATA Line 7Ø sends us back for more DATA Line 1ØØ holds the DATA we are going to POKE into memory.

Now - RUN

Well, that was sure fast. I wonder what it did? How can we find out? Should we PEEK at it? Yes, but let's leave the old program in and just start a new one at 2ØØ.

```
2ØØ REM * PEEK PROGRAM *
21Ø FOR N = 1ØØØØ TO 1ØØ1Ø
22Ø PRINT N, PEEK (N)
23Ø NEXT N
```

. . . and RUN 2ØØ

```
10000   80
10001   69
10002   69
10003   75
10004   45
10005   65
10006   45
10007   66
10008   79
10009   79
10010   33
```

How about that? We really did change the contents of those memory locations. We shot the numbers from our DATA Line right into memory. Now if we only knew what those numbers stood for. Wonder . . . if we changed them to ASCII characters, would they tell us anything?

Add:

```
2Ø5 CLS
22Ø  LOCATE  13,15  +  N-1ØØØØ  :  PRINT  CHR$
   (PEEK(N));
```

to PRINT at a certain location on the screen

. . . and RUN 2ØØ

PRINT THE RESULTS HERE

And that's how PEEK and POKE work.

Special POKE Addresses

Function Keys

Let's take one more look at our 10 special function keys. We'll leave Keys 2-5, 7 and 8 alone since they seem to be pretty useful, but why don't we change the others? After all, this is a personal computer. Enter this NEW program:

```
1Ø KEY 1, "LIST" + CHR$(13)
2Ø KEY 6, "EDIT"
3Ø KEY 9, "AUTO" + CHR$(13)
4Ø KEY 1Ø, "CLS" + CHR$(13)
5Ø DEF SEG : POKE 1Ø6,Ø
```

. . . and RUN.

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SAVE this program as "KEYS". Notice the bottom row on the display, with our new creations. We perform the POKE in line 5Ø to avoid complications on the INPUT buffer. This is a good idea whenever we program any of the "soft" keys, or after INKEY$ has received the last character from a Soft Key string.

Perhaps the most used of these keys will be F10. When we get in the habit, it's so convenient to just hit a single key to CLear the screen. When we use F10 there can't be anything on the screen on that line, or we'll get a Syntax error. Best in that case to use Ctrl-Home instead.

Suppose we like this new "soft key" arrangement so much that we want the computer to automatically power-up with it, instead of what comes with the computer. Disk users have a beautiful feature called AUTOEXEC.BAT that bypasses typing in the DATE and TIME and AUTOmatically EXECutes a command, such as LOAD BASIC. So, let's add one more line before we go back to DOS:

```
6Ø KEY ON : NEW
```

Be sure to SAVE the program as "KEYS" before you RUN it. We put in the NEW command so the program will erase itself after the Keys are reprogrammed.

We include here the process without explanation for the thrill seekers among us who can't leave well enough alone.

First return to DOS (SYSTEM) and make the prompt read:

```
A>-
```

Now (temporarily) take the write-protect tab off the COPY of your System Master disk you've been using, and type:

```
COPY CON: AUTOEXEC.BAT
DATE
B:
A:BASICA KEYS
  <F6>
```

And the Display reads:

```
1 file(s) copied
```

The first instruction copies from the CONsole (keyboard) into the file AUTOEXEC.BAT. After we type in the DATE, the rest of the routine takes care of the startup process we have to go through. We could also make the last Line simply:

```
A:BASICA
```

That way we wouldn't have to RUN a program, just load BASICA.

From now on, the computer will AUTOmatically power-up with the soft keys programmed as before, as long as we use the same System Master disk. Other disks could be prepared for other automatic soft key programming, or a variety of BASIC programs held on 1 disk and called up for different purposes as needed.

Video Display Buffers

Beginning at absolute address B0000 hex (720896 decimal (704K)) is a 4K memory buffer on the monochrome display card. Since there are 2000 print positions on the screen, we need 2 memory locations for each screen position.

The first location holds the actual ASCII code for the character (an even numbered address). The second is the "attribute" for the corresponding character (odd address). The attribute tells us what mode the character was printed in, such as high intensity, underlined, blinking, etc.

We already know about ASCII codes. The code for the attribute is a little harder to understand. Each byte of address is made up of 8 bits. We'll label the bits as follows:

128 - □
064 - □
032 - □
016 - □
008 - □
004 - □
002 - □
001 - □

Why not label the bits 1,2,3,4,. . .8? Well, the numbers shown are the actual ASCII numbers that activate the respective bits. CHR$(128) activates or "sets" the top one, and CHR$(1) sets the bottom one. CHR$(7) sets the bottom three (4 + 2 + 1).

It all goes back to binary math. (Oh, great!) If we send a decimal 1 (0000 0001 binary), the bottom bit is set. A decimal 2 (0000 0010 binary) sets bit 2. A decimal 3 (00000011 binary) sets bits 1 and 2 and so on.

So what does all this mean? It means that when we PEEK at an odd address in the buffer, we see a coded attribute of the ASCII character in the memory location just preceding it.

Let's look again and find out what the different bits mean:

128 - □ Flash
064 - □
032 - □ Background
016 - □
008 - □ Intensity
004 - □
002 - □ Foreground
001 - □ Underline

If the bottom 3 bits are set (1+2+4) the character is normal white on black.

If the 5th, 6th, and 7th bits are set (16+32+64=112) the character is reversed (black on green, background is ON, foreground is OFF).

If we take a normal character and set the top "flash" bit, the attribute changes from 7 (1+2+4) to 135 (1+2+4+128). If we then set the 4th "Intensity" bit, we will have a high intensity flashing character with attribute 143 (1+2+4+8+128).

If we set the bottom underline bit only, we will have a normal underline character. If we then set the Top bit our character will flash with an underline (attribute 129). Etc. Do you follow the grand plan?

To get a better feeling for all this LOAD in the COLOR 1 program from Chapter 37 and make the following changes:

```
210  DEF SEG = &HØØØ ' SEGMET IS
     MONOCHROME DISPLAY BUFFER
220  PRINT
230  FOR X=Ø TO 3Ø STEP 2
240  IF X=16 THEN PRINT
250  PRINT PEEK(X); PEEK(X+1),
260  NEXT X
270  PRINT : PRINT
```

SAVE as COLOR2.

. . . and RUN

We immediately recognize the numbers 67,79,77,80, etc as the ASCII codes for the letters of the word "COMPUTER". The other numbers are the attributes we just learned. For example the first "M" is high intensity so its attribute is 15 (1+2+4+8), and the bottom 4 bits are set.

POKEing Characters

Now that we have done some PEEKing, let's do some POKEing to the video screen. ENTER this short NEW program:

```
1Ø DEF SEG = &HBØØØ ' 45Ø56 DECIMAL
    = 72Ø896 ABSOLUTE
2Ø CLS
3Ø FOR X = Ø TO 255
4Ø POKE 2*X, X
5Ø NEXT X
6Ø LOCATE 6,1
```

. . . and RUN

Nothing new here. But look carefully at positions 7-13 and 28-31. We discovered some new characters! We can use these fancy new characters only by POKEing to the video memory. For example let's see some of these codes in action. Type from the command level:

```
PRINT CHR$(3Ø) ,
```

the cursor jumps up and partly erases what we typed. 3Ø is the code for cursor up. Now type:

```
POKE 15ØØ,3Ø
```

a triangle appears to the right. Position the cursor to the left of the triangle and type:

```
1ØØ PRINT "
```

Using the Del key on the key pad, move the triangle until it is against the quote marks. End this line with a "; and Enter. Now type:

```
GOTO 1ØØ
```

What happened? The cursor jumps up just like we PRINTed CHR$(3Ø). Now do a LIST. Line 1ØØ now says:

```
1ØØ PRINT "1
```

Strange.

Exercise:

Write a program which displays the word POKE centered in the top of the video display, using the POKE statement instead of PRINT.

Debugging Programs

Quick - The Raid!

By now, the Computer has given us plenty of nasty messages. We know something's wrong, but it isn't always obvious exactly where, or why.

How do we find it? The answer is simple—be very systematic. Even experienced programmers make lots of silly mistakes . . . but the experience teaches us how to locate mistakes quickly.

Hardware, Cockpit Or Software?

The first step in the "debugging" process is to isolate the problem as being either: 1.A hardware problem 2. An operator problem, or 3. A software problem.

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Is it Further To Boca Raton Or By Bus?

Starting with the least likely possibility - is the Computer itself working properly? Chances are very high that the Computer is working perfectly. There are several very fast ways to find out.

A. Type

```
PRINT FRE(Ø)
```

If there is no program loaded into memory, the answer should be:

```
334Ø2
```

Or the correct value previously noted for your system. If there is a program loaded, the answer should be some value less than 33402.

If the answer is more than 33402 (assuming of course we have not added more memory), there may be trouble. Or, it's possible that the answer is a negative number . . . same solution.

Possible Solution

In either of the above cases, shut the Computer off completely. (Or, as they say in the big time, "Take it all the way down.") Let it sit for a full minute before turning it on again.

Turn the machine back ON, type NEW and try the PRINT FRE(0) test again. If the results are the same, there is probably a chip failure that will require professional troubleshooting and replacement.

B. One Last Try

Before full panic sets in, however type NEW and enter this program. It assigns every free memory location in RAM a specific value, then reads that value back out onto the screen.

Type (very carefully):

```
5 DIM A(83ØØ)
1Ø FOR X = 1 TO 83ØØ : A(X) = X : NEXT X
2Ø FOR Y = 1 TO 83ØØ : PRINT A(Y);
3Ø IF A(Y) - A(Y) <>1 THEN PRINT "BAD" : BEEP
4Ø NEXT Y
```

. . . and RUN

After a short wait for the array to "spin-up", the monitor should display:

1 2 3 4 5 6 7 8 (etc. through 8300)

If the word "BAD" appears on the screen, we may have found the problem.

You will probably want to enter this test program into your computer, try it out before you need it, then save it on disk or tape as "MEMTEST" and hope that you won't . . . (need it, that is).

Video Display Problems?

The Video Display is very similar to a television set. It has adjustments for brightness and contrast right on the front of the monitor.

Idiot Here—What's Your Excuse?

Of course you don't make silly mistakes! Now that's settled, 1. Is everything plugged in? Correctly? Firmly? 2. Are the recorder batteries fresh (if you're using batteries)? 3. Is the recorder volume level properly set? 4. Is the recorder tone switch on "high"? 5. Are you using "legal" commands? if so . . . Go walk the dog, then check it all over again.

If . . . Then

If the trouble was not found in the cockpit or with the hardware, there is probably something wrong with your program. Dump out the troublesome program. LOAD in one that is known to work and RUN it as a final hardware and operator check.

Common Errors

Let's look at some of the common sources of "computer-detected errors".

1. Assume the error is in a PRINT, or INPUT statement. Did you:
   a. Forget one of the needed pair of quotation marks?
      EXAMPLE:
      `1Ø PRINT "ANSWER IS, X: GOTO 5`
      ERROR: No ending quotation mark after IS
   b. Use an illegal variable name?
      EXAMPLE:
      `1Ø INPUT 6G`
      ERROR: Must be recognizable by the Computer.
   c. Forget a semicolon or comma separating variables or text, or bury the semicolon or comma inside quotation marks?
      EXAMPLE:
      `1Ø PRINT "THE VALUE IS "V X`
      ERROR: A semicolon is missing between V and X
      (so the variables are not properly separated.)
   d. Forget the Line number, accidentally mix a letter in with the number, or use a Line number larger than 65529?
      EXAMPLE:
      `72B3 PRINT "BAD LINE NUMBER."`
      ERROR
   e. Accidentally have a double quotation mark in your text?
      EXAMPLE:
      `1Ø PRINT "HE SAID "HELLO THERE."`
   f. Type a Line more than 255 characters long?
   g. Misspell PRINT or INPUT? (It happens!)
   h. Accidentally type a stray character in the Line, especially an extra comma or semicolon?
2. If the error is in a READ statement, almost all the previous possibilities apply, plus:
   a. Is there really a DATA statement for the computer to read? Remember, it will only read a piece of DATA once unless it is RESTOREd.
      EXAMPLE:
      `1Ø READ X,Y,Z`
      `2Ø DATA 2,5`
      ERROR: There are only two numbers for the Computer to read.
      If we mean for Z to be zero, we must say so.
      `2Ø DATA 2,5,Ø`
3. If the bad area is a FOR-NEXT loop, most of the previous possibilities also apply, plus:
   a. Do we have a NEXT statement to match the FOR?
      EXAMPLE:
      `1Ø FOR A=1 TO N`
      ERROR: Where's the NEXT A?

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CIRCLE 375 ON READER SERVICE CARD

Some of these FOR-NEXT loop errors won't cause actual error messages; instead your program may wind up in endless loops, requiring the use of the BREAK key.

b. Do you have all the requirements for a loop—a starting point, an ending point, a variable name, and a STEP size if it's not 1?
   EXAMPLE:
   ```
   1Ø A=1 TO N
   ```
   ERROR: Must have a FOR and a NEXT.

c. Did you accidentally nest 2 loops using the same variable in both loops?
   EXAMPLE:
   ```
   1Ø FOR X=1 TO 5
   2Ø FOR X=1 TO 3
   3Ø PRINT X
   4Ø NEXT X
   5Ø NEXT X
   ```
   ERROR: The nested loops must have different variables.

d. Does a variable in a loop have the same letter as the loop counter?
   EXAMPLE:
   ```
   1Ø A=22
   2Ø FOR R=1 TO 5
   3Ø R=18
   4Ø Y=R*A
   5Ø PRINT Y
   6Ø NEXT R
   ```
   ERROR: The value of R was changed by another R inside the loop, and NEXT R was overRUN, since 18 is larger than 5.

e. Did you nest loops incorrectly with one not completely inside the other?
   EXAMPLE:
   ```
   1Ø FOR X=1 TO 6
   2Ø FOR Y=1 TO 8
   3Ø SET (X,Y)
   4Ø NEXT X
   5Ø NEXT Y
   ```

4. If the goofed-up statement is an IF-THEN or GOTO
   a. Does the Line number specified by the THEN or GOTO really exist? Be especially careful of this error when you eliminate a Line in the process of "improving" or "cleaning up" a program.

5. The ERROR comes back as FRE(0) (Out of memory) but the PRINT FRE(0) indicates there is room left in memory. If we get an error and are using an array, **extra room (up to hundreds of bytes) has to be left for processing.** You have probably overRUN the amount of available memory.

6. The ERROR comes back as SUBSCRIPT OUT OF RANGE.
   a. Did you exceed the limits of one of the built-in functions?
   b. Did one of the values on the Line exceed the maximum or minimum size for numbers?

To find out whether you did any of these things, PRINT the

values for all the variables used in the offending Line. If you still don't see the error, try carrying out the operations indicated on the Line. For example, the error may occur during a multiplication of two very large numbers.

These certainly aren't all the possible errors one can make, but at least they give us some idea where to look first. Since we can't completely avoid silly errors, it's necessary to be able to recover from them as quickly as possible.

By the way . . . a one-semester course in beginning typing can do wonders for your programming speed and typing accuracy.

From The Ridiculous To The Sublime:

All the computer can tell us is that we have (or have not) followed all of its rules. Assuming we have followed all the rules, the Computer will not ask "Questions"—even if we're asking it to do something that's quite silly and isn't at all what we intended. It will dutifully put out garbage all day long if we feed it garbage—even though we follow its rules. Remember GIGO (Garbage In, Garbage Out)? If the program has no obvious errors, what might be the matter?

Typical "unreported" errors are:

1. Accidentally reinitializing a variable—particularly easy when using loops.
   EXAMPLE:

```
10 FOR N=1 TO 3
20 READ A
30 PRINT A
40 RESTORE
50 NEXT N
60 DATA 1,2,3
```

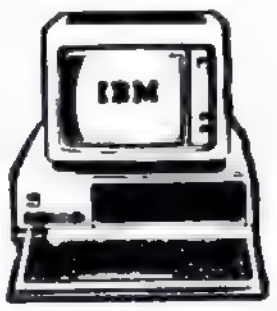
2. Reversing conditions, i.e. using "=" when we mean "<>", or "greater than" when we mean "less than."
3. Accidentally including "equals", as in "less than or equals", when you really mean only "less than."
4. Confusing similarly named variables, particularly the variable A, the string A$, and the array A(X). They are not at all related.
5. Forgetting the order of program execution—from left to right on each Line, but multiplications and divisions always having priority before additions and subtractions. And intrinsic functions (INT, RND, ABS, etc.) having priority over everything else.
6. Counting incorrectly in loops. FOR I=0 TO 7 causes the loop to be executed eight not seven, times.
7. Using the same variable accidentally in two different places. This is okay if we don't need the old variable any more, but disastrous if we do. Be especially careful when combining programs or using the special subroutines.

But how do we spot these errors if the computer doesn't point them out? Use common sense and let the computer help you. The rules to follow are:

1. Isolate the error. Insert temporary "flags." Add STOP, END, and extra PRINT statements until you track the error down to one or two Lines.
   EXAMPLES OF USEFUL FLAGS:

```
299 PRINT "       LINE #299"
399 IF X<0 THEN PRINT "X OUT
    OF RANGE AT #399" : STOP
```

Line 299 will help us check whether the Line immediately Line 299 is executed. This helps us follow program



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flow. Line 399 might be used to locate the point where X goes out of range.

Although the details would be different for your program, these techniques can be applied easily.

2. Make your "tests" as simple as possible. Don't add complications until you've found the error.
3. Check simple cases by hand to test your logic, but let the Computer do the hard work. Don't try to wade through complex calculations with pencil and paper. You'll introduce more new mistakes than you'll find. Use the calculator mode, or a separate hand calculator to do that work.
4. Remember that we can force the Computer to start RUNning a program at any Line number we choose. Just type:

   RUN ###

   (where ### represents the desired Line number). This is a useful tool for working your way back through a program. You give the variables acceptable values using calculator-mode statements, and then RUN the program starting from some point midway through the program flow. If the answers are what we expect, then the error is before the "test point" you've created. Otherwise, the error is after the test point.
5. Remember also that it's not necessary to LIST the entire program just to get a look at the one section of it. Just type:

   LIST ###–###

   (where ### tells the Computer on which Lines you'd like to start and end the LIST).
6. Practice "defensive programming." Just because a program "works okay," don't assume it's dependable. Programs that accept INPUT data and process it can be especially deceptive. Make a point of checking a new program at all the critical places.

   Examples: A square root program should be checked for INPUTs less than or equal to zero. Math functions we have programmed should be checked at points where the function is undefined, such as TAN(90).

Beware Of Creeping Elegance

Programs can grow to become more and more elegant with the ego reinforcement of the programmer as success follows success. With this "creeping elegance" comes increased chance of silly errors. It's fun to let your mind wander and add on some more program here, and some more there, but it's easy to lose sight of the purpose of the program. It is at times like this when the flow chart is ignored and the trouble begins. Nuff said.

We'll leave some space here to make notes on your own debugging and troubleshooting ideas . . .

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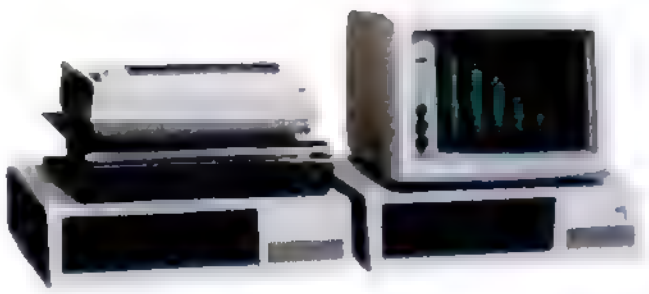
Index To Advertisers

READER SERVICE NO.	ADVERTISERS	PAGE
101	Abacus Associates Inc.	445
134	ABM	231
127	ABW	222-223
135	Access Unlimited	555
103	Advanced Computer Products	385
102	Advanced Data Technology	103
104	Aegis Systems	472
105	Aerocomp	311
106	Affordable Software	442
107	Affordable Software	156
108	Affordable Software	235
109	Alpha Byte	81
110	Alpha Byte	37
111	Alphanetics	547
112	Alpha Software	2
139	Alpha Software	13
113	Alta Systems, Inc.	449
114	Amdek Corporation	179
115	American Small Business Computers	373
116	American Training International	4
141	Anatron Inc.	58-59
133	Anidata	505
117	Ann Arbor Software Associates	177
118	Apparat	184
121	Applied Creative Technology, Inc.	120
119	Application Techniques	168
120	Applied Computer Products Corp.	250
122	Applied Software Technology	301
123	Apstek, Inc.	352
124	Archives, Inc.	145
125	Arlington Software Systems	292-293
126	Armonk Corp.	420
*	Arrix Logic	216
136	Artech, Inc.	320
128	Artificial Intelligence Research Group	452
129	Ashton-Tate	134-135
143	Ashton-Tate	314
151	Ashton-Tate	101
130	Aspen Software Co., Inc. (Dictronics Publishers)	188
131	Aspen Software Co., Inc. (Dictronics Publishers)	408
133	ASTEC	386
154	AST Research	32-34
494	Atsuko Computing International	457
149	Automated Information Management	456
137	Bard Software Publisher	425
138	BASF Systems	174
142	BCC, Inc.	445
175	B.C. Systems	333
144	Beaman Porter	167
145	Bella Computers	238
146	Berzurk Systems	312
147	Best Programs	65
148	BHRT Inc.	455
176	Bible Research Systems	291
150	Blaise Computing Inc.	463
177	Blue Water Systems	197
152	The Bottom Line	416
186	BPI Systems	263
157	BPS, Inc.	173
153	BT Enterprises	427
156	Business Managers	409
155	Business Master	553
*	Cab-Tek	446
140	Cactus Technology, Inc.	251
*	California Micro Computer	451
158	Camrass Corporation	454
159	Care Computer Systems	458
166	Carpet Connection	281
187	CDEX Corportion	296
188	Celestial Software	146
192	Central Point	424
163	Checks-to-Go	176
164	Chrislin Industries Caribe	81
193	CMA	456
167	ColorCorp	30
168	Columbia Data Products	299
160	Columbia National General Agency	137
161	Comnet	414
169	Comprehensive Software Support	17
170	Compuad	478
171	Compucart	265
194	Compumart	448
172	Compusoft	324
173	Computech Group Inc.	194
199	Computer Age of San Francisco	455
178	Computer Control	404
179	Computer Entrepreneur	377
180	Computer Exchange	60
181	Computer Innovations, Inc.	190
204	Computer Intelligence Corp.	453
182	Computerline	157
210	Computerline	322
183	Computer Mail Order	327
184	Computer-Mate, Inc.	153
211	Computer Outfitters	442
162	Computer Outlet	475
185	Computer Peripheral Systems	365
190	Computer PX	455
189	Computer Toolbox	451
191	Computer Workshop	457
195	Conographic	215
212	Consolink Corp.	200
196	Consultant Systems, Inc.	508
197	Continental Software	16
198	Contract Services Associates	333
165	Control Systems	180
200	Coosol	161
201	Corona Data Systems	3
202	Cortland Data Systems	421
203	Corvus Systems	237
*	Covers-A-Lot	453
214	CP Aids	450
221	CPU Shop	433
205	Creativity Unlimited	449
226	Crown Discount Corp.	458
479	C-Systems	444
223	CTI	387
*	Curtis Manufacturing	306
207	Cybernetics	274
208	Cypher	507
227	Data Access Group	435
475	DataCase	452
213	Data Consulting Group	443
228	Data Impact	480
215	Datamost	249
216	Data Smith	454
217	Data Source Systems	430
218	Datatek	394
498	Data Translation	360
219	Davong Systems, Inc.	339
220	DB/DC Software Associates	447
230	DMG Products	334
222	Diamond Software	41

READER SERVICE NO.	ADVERTISERS	PAGE
231	Digital Dimensions	504
224	Digital Marketing	24
225	Digital Research	221
229	Distributed Computing Systems	543
209	Don-El Computer Products	457
232	Duncan Atwell Computerized Tech.	264
233	Durant Software	513
286	Dynax	228
234	800 Software	80
235	Eastern Enterprises	468
236	Electronic Specialists	443
237	Emerging Technologies Consultants	371
238	Executive Software Programming	500
240	E-Z Tax	282
243	1st National Computer	356
242	47th St. Computer	343
462	Fast 'n Fun	310
246	Ferox Microsystems	272
241	Financier Inc.	Cover 2
244	Flagstaff Engineering	218
245	Floppy Disk Services	441
251	FMJ, Inc.	459
239	Fourth Technology	464
248	Fox & Geller	309
249	Frederick Computer	318
250	FTG Data Systems	413
252	Funtastic Inc.	255
253	Futra Company	158
254	FYI, Inc.	383
255	Genie Computer Corp.	21
256	GM Enterprise	312
270	Good Software	402
257	Graphic Software	353
276	GTCO	410
260	H&E Computronics	104
258	Haupauge Computer Works, Inc.	349
259	Hayes Microcomputer	207
278	Hayes Microcomputer	206
261	Hercules Computer Technology	70
264	Houston Instruments	359
262	Howard Sams	199
263	Howard Sams	259
*	Howard Software	170
266	Howe Software	447
267	HRCOM International	178
268	IB Magazette	510
269	IBM	18-19
271	ICR Future Soft	423
273	IDE Corp.	122-123
274	Indigo Data Systems, Inc.	43
*	Individual Software Inc.	302
275	Info Devices	389
277	Inner Loop Software	444
272	Innosys Inc.	346
285	Innovative Data Technology	391
294	Innovative Software	212
300	Insoft	132
283	Integral Data Systems	245
284	Ipex International Inc.	447
433	Jack Strick & Associates	448
287	Johnson Associates Software	436
304	John Wiley & Sons	73
488	Kalgo Electronics Co., Inc.	446
305	Kawa Systems International	455
307	Key Microsystems	459
289	Keytronic, Inc.	254
290	Laboratory Microsystems	388
291	Lang Systems	348
*	Lawrence Woodwork	261
280	Leading Edge	252
281	Leading Edge	253
292	Leading Edge	Cover 3
293	Lexisoft	219
310	Lifeboat Associates	239
295	Lifetree Software Inc.	313
296	Lighthouse Distributing	421
297	Logical Devices	453
282	Logicsoft	140-141
265	Logicsoft	143
311	Logitech	474
322	Mai Sorbus	358
301	Mark of the Unicorn	277
302	Maynard Electronics	84-85
311	MBI	110-111
*	MBSI	5
298	MediSoft	443
323	MediSoft	454
306	Memory Technologies Inc.	186
399	Metafile (Sensor-Based Systems)	289
300	Metasoft Corp.	175
309	Micro Computer Sales	443
312	Micro-Computer Taxsystems Inc.	195
*	Microcorp	87-88
314	Micro Data Collection Corp.	456
315	Micro Flash	453
489	Micrografx	446
316	Micro Grip Ltd.	450
317	Microhouse	10-11
*	Micro Investment Software	387
319	Micromart	154-155
320	Micro Match	376
325	Micro Peripheral Corp.	470
321	Micro-Q	364
329	Micro Pro	66-67
337	Micro Rim	260
*	Micro Soft, Inc.	1
326	Microstuf Inc.	56-57
327	Micro Synergy Inc.	193
353	Micro Synergy Inc.	192
328	MicroTaure	244
330	Micro Video Learning Systems	181
331	Microware	406
332	Miller Microcomputer Services	415
364	Mirror Image Software Inc.	189
338	M.I.S. Consultants	347
333	MK Research	553
*	Moore Business Forms	372
334	Morgan Computing Corp.	191
335	Mountain Computer Inc.	300
336	MPPI	451
*	MRM Enterprises	458
366	Nat Hellman III, Inc.	164
339	Nat Hellman III, Inc.	442
340	National Computer Shows —PC '83	130-131
342	NEC Information Systems, Inc.	169
343	Network Consulting, Inc.	298
372	Network Press	327
344	N.F. Systems Ltd.	479
341	Norell Data Systems Corp.	345
376	Norell Data Systems Corporation	451
379	North American Business Systems	151
346	Norton Utilities	220
345	Novell	46
406	Ohm Electronics	452
347	Omega Microware, Inc.	214
348	Omicron	398

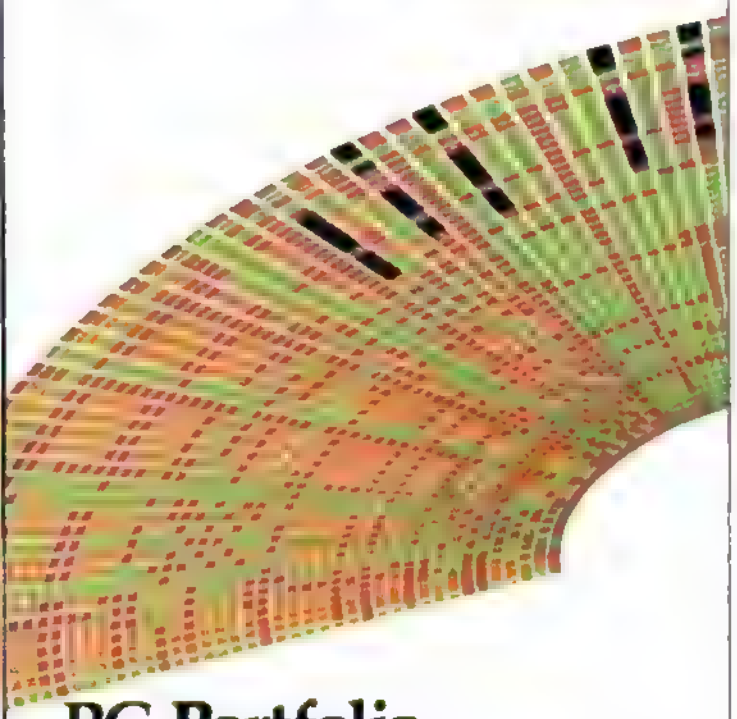
READER SERVICE NO.	ADVERTISERS	PAGE
350	Omric Corp.	458
407	Optimum Data Processing	448
411	Orchid Technology	234
349	Orion Software	71
490	Orthosoft—Roseware Systems	301
351	Oryx Software	497
352	Owl Software	407
413	Pacific Computers	462
354	Payless Tax II Inc.	375
355	PBL Corp.	149
324	PC Clearing House	68-69
356	PC Connection	202-203
357	PC Expo	20
418	PC Software	108
358	PC Software, Inc.	323
360	PCEZ	393
361	PCX	384
362	PDS/Compushack	242-243
363	Performance Engineered Programming	414
365	Persoft Inc.	291
421	Personal Computer Products	506
367	Persyst	108
377	Phaser Systems Inc.	55
*	Phaser Systems Inc.	53-54
368	Plantronics/Fredricks	74
369	Pop Com, Inc.	450
370	Practical Peripherals, Inc.	49
371	Prism Products/Kal	138
373	Professional Microsystems	153
374	Professional Software Inc.	26-27
423	Profitsystems	271
375	Programming International	550
378	Pure Data Ltd.	378-379
380	Pyxel	144
381	Quadram Corp.	22-23
382	Quadram Corp.	284-285
383	Quala.	513
427	Quantum Software	201
384	Qubie Distributing, Inc.	332
385	Qubie Distributing, Inc.	241
492	QuCeS, Inc.	354
386	Quest Research, Inc.	454
493	Radio Technology	324
431	Raytronics	279
387	Readi-Ware Systems	503
388	Realia, Inc.	442
389	Red Baron Computer	361
390	Retail Solutions Inc.	72
391	RGB Designs	446
486	Robert J. Brady	107
432	Rocky Mountain	285
438	RoseSoft	405
443	R.T.C.S. Corp.	119
393	Santa Clara Systems	136
394	Satellite Software International	196
446	Saturn Consulting	445
395	Saturn Systems Inc.	70
397	Scitor Corp.	256
447	Screen Data Corp.	501
448	ScreenPlay	205
449	SDL Corporation	554
398	Seattle Computer	305
400	Sierra-On-Line, Inc.	86
401	Sigma Designs	428
402	Simple Soft	330
453	Sofstar	48
404	Soft Craft	372
405	Softech Microsystems	326
454	Software Arts	182-183
409	Software Associates	331
400	Software Banc	315
410	Software Laboratories	209
416	Software & Stuf	198
412	Software Models	447
414	Software Publishing	366-367
415	Software Solutions	395
*	Software Technology for Computers	336-337
417	Solution Software Systems	444
*	Sorcim Corporation	8-9
419	Sourceware	448
420	Southeastern Software	240
*	Spectrum Software	350
*	Spinnaker Software	14-15
422	Squire Buresh Associates, Inc.	449
424	SSR Corp.	152
*	Stansbury	392
425	Standard Software	163
*	StarLogic	150
429	Starside Engineering	400
428	Starware Corp.	444
430	STB Systems Inc.	40
434	Strictly Software	390
435	Strohl Systems Group	452
496	Summa Software	432
437	Sunward	211
455	SuperSoft	76
439	SuperSoft	39
456	Sybex	227
436	Symmetric Software	344
458	Symtec	450
440	Systemics	403
441	Systems Management Assoc.	232
442	Systems Plus	401
444	Tac	44-45
445	Tallgrass Technologies	28
487	Tall Tree Systems	303
*	Tax Help, Inc.	342
459	Techland Systems	96
463	Techland Systems	145
450	Tecmar Inc.	12
451	Tecmar Inc.	Cover 4
452	Tecmar Inc.	121
466	Tecmar Inc.	185
299	T.K. Engineering	539
457	Tokyo Electronics	172
467	Trak Microcomputer Corp.	75
471	Transtar	276
460	TSK Electronics Corp.	325
*	United Computer Corp.	159
483	United Microsystems	321
474	U.S.I.	316
478	U.S.I. International	351
*	US Software	308
481	Vandata	290
464	Ventel	107
465	Verbatim	194
482	Vertex System	445
491	Virtual Combinatics	429
488	Vista Computer Co.	338
469	Von Leivendyke Enterprises	29
495	The Walton Group	511
*	Warner Books	502
473	Watsoft Products	449
497	Watsoft Products	456
*	Westico Inc.	319
472	Westware Inc.	236
499	Windmill Software	360
500	World Wide Data Systems	304
477	Xedex Corp.	364
501	XY Quest Inc.	217
480	Your Business Software	368
482	Yucaipa Software	457
502	Zen Tek Corporation	160
485	Ziatech	171
503	Zephyr Services	459

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128K Bytes Memory

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Wish List



An IBM-compatible CRT that could be flopped over to one side to change the format for graphics.

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Floyds Knob, IN





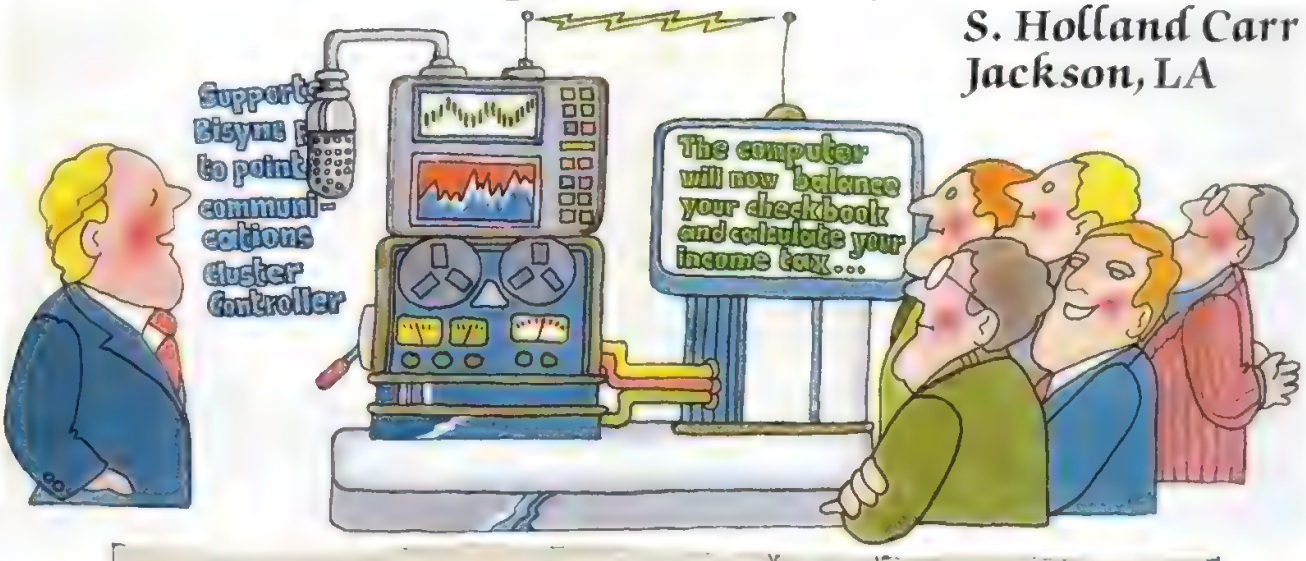
A program to translate Spanish and French into English.

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Roslyn, N.Y.



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S. Holland Carr
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131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160
161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190
191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220
221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280
281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310
311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340
341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370
371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430
431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460
461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490
491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520
521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580
581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610
611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640
641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670
671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700

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131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160
161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190
191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220
221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280
281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310
311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340
341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370
371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430
431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460
461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490
491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520
521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580
581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610
611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640
641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670
671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700

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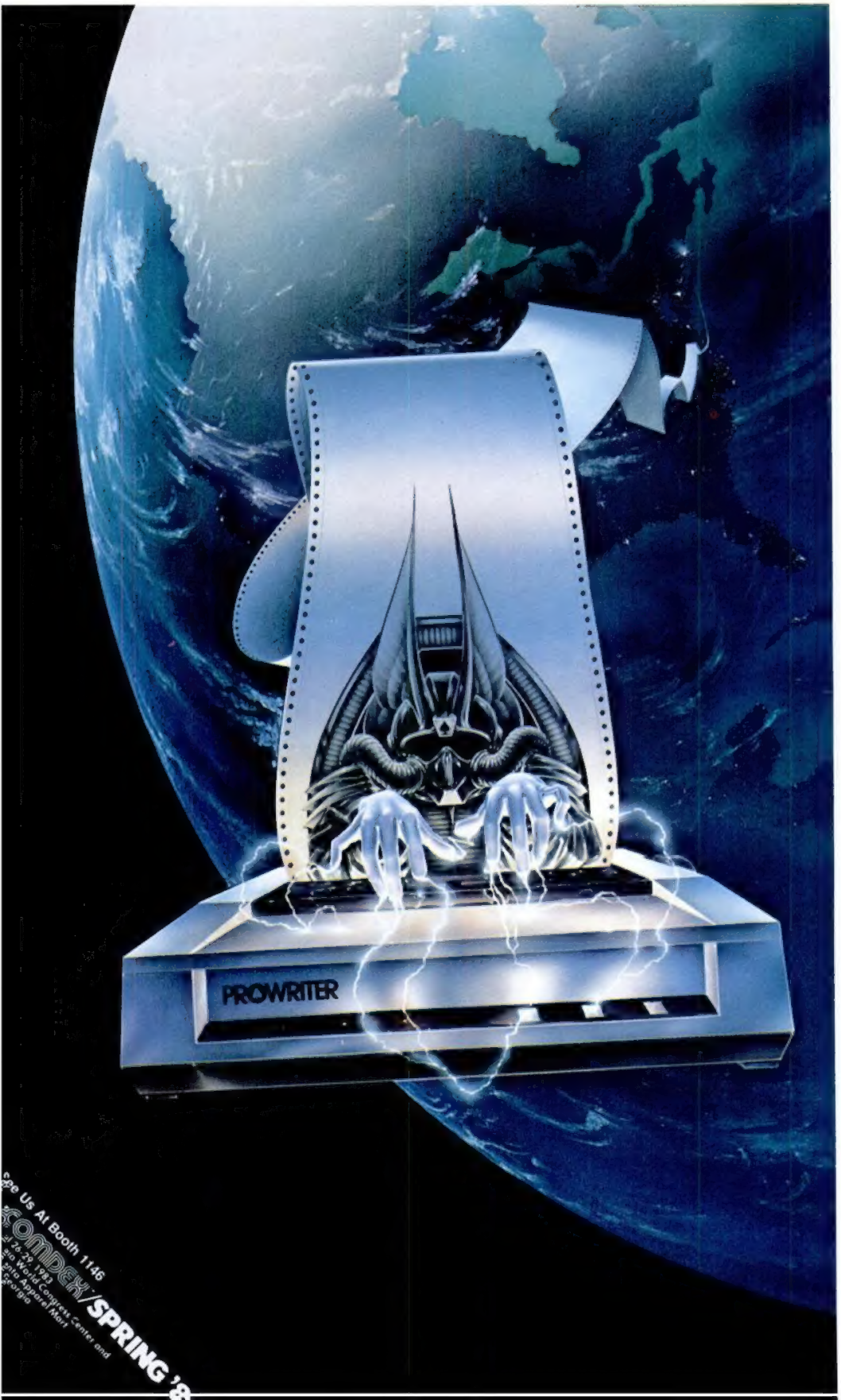


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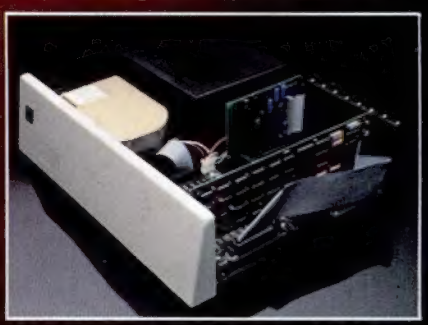
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